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A

CONCISE TREATISE

ON

OPERATIVE SURGERY,

DESCRIBING

THE METHODS ADOPTED BY THE ENGLISH, CONTINENTAL,
AND AMERICAN SURGEONS;

SELECTED FOR

THE USE OF JUNIOR PRACTITIONERS AND STUDENTS.

Illustrated by Twelve Plates.

By W. P. COCKS, Surgeon,
AUTHOR OF ILLUSTRATIONS OF S. COOPER'S SURGICAL
DICTIONARY.

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PREFACE.

To bring within the space of a single volume that information now so widely diffused as to be attained only by those who possess ample pecuniary means and much leisure, has been considered worthy the labour of the compiler and the patronage of the student. The great advances in surgical knowledge, and the corresponding increase of literary productions in this important branch of medical education, have afforded facilities for this undertaking, of which the author has most amply availed himself; for, although not calculated to supersede the more elaborate treatises on the art, it comprises succinct notices of nearly all the operations, major and minor, on the living and dead subject, according to the methods of the best surgeons in this country, on the European continent, and in America. The opinions of the authorities consulted are given as much at length as the nature of the undertaking will admit; and it is presumed that no injury has been done to the facts recorded by the manner of relation.

Confining the objects of the work within the limits of operative surgery, symptoms are given in cases of dislocations and fractures only. The necessity for this exception is found in the frequency of such accidents.

By the arrangement pursued, the student is led from the simple operation of bleeding, cupping, &c. progressively through, until he reaches the highest branches of the art. Thus, as an illustrative compendium of surgery, the volume embodies an immense number of facts, and furnishes a complete catalogue of cases. The operator, referring to the index, puts his finger at once upon the best recorded method of accomplishing his design; and with the text before him he can act promptly and effectually. If at a loss, as all men are occasionally under emergencies, his views are directed, and his ideas brought into the proper channel of thought, by the instruction which meets his eye.

Every practitioner will regulate his conduct by the circumstances of the case before him; but it is of infinite importance that his first steps be in the right road: nor will he esteem it a light advantage that his subsequent progress is sanctioned by the authority of the experienced masters of the art who have preceded him.

January 1837.

A
CONCISE TREATISE
ON
OPERATIVE SURGERY.

INTRODUCTION.

SURGERY is that part of medical science which teaches the method of curing external diseases by manual operations. In general acceptation, however, the term implies a considerably wider field of investigation than this definition imports, the limits being by no means so narrow nor so distinctly marked, since the knowledge of internal remedies is indispensable to the due understanding of the surgeon's art. It is usually considered with regard to two particulars — principles and practice, the former have their foundation in the curative process of nature applying her mode of operation to the circumstances of diseased parts in the living, and matured by dissection of the dead, body.

Previous to operations in surgery, it is certainly a matter of the utmost importance to rectify what is amiss in the patient's health and constitution as far as possible: an inattention to these things has frequently prevented success attending operations that have been well performed; after which, the greatest degree of circumspection is also demanded, and sometimes found absolutely necessary to obtain the proposed end and design of them; and, indeed, this observance cannot be too earnestly inculcated.

The latter requiring gentleness of manners to induce the confidence and esteem of the patient;

It was a remark of John Hunter, that a surgeon should never approach the victim to an operation, but with great humility, and considering it as a disgrace to the art, that we could not cure the disease without having recourse to one.

Skilfulness in the use of instruments, and self-possession equal to the most sudden emergency; a clear head to conceive the means of relief, and a firm hand to apply them.

The necessity for manual dexterity and precision, in addition to that cultivation of the mind, which leads to quickness of observation and soundness of judgment, would appear to be almost self-evident, but many of the misfortunes in surgery, which is deeply to be regretted are very numerous, may be traced to a want of these qualifications.

The study of anatomy, as the groundwork of all surgical knowledge, is too obviously necessary to require a word in recommendation: it leads to correct notions of the nature, form, and materials of the human body, as well as the changes to which the structure is liable. This study is materially assisted by the use of morbid specimens, which cannot, however, supersede the necessity for dissection. Experience in this matter is every thing; and the exercise which brings the student into contact with every part of the dead body can alone impart the practical knowledge capable of inspiring confidence and insuring success, when called upon to operate upon the living.

APPLICATION OF LEECHES.

The part to which they are to be applied should be well washed, and, if covered with strong hairs, shaved, and the skin moistened with a little blood or warm milk, or rubbed over with a piece of fresh beef. When a large number of leeches are to be applied, six or eight are put into a wine glass, the bottom of which is covered with a piece of paper or linen rag to prevent them from sticking; turn the glass down upon the skin on which they soon fasten. The rag should always project beyond the edges of the glass, and when it is reversed, by pulling on the ends of the linen, the leeches are seen lying upon the skin. Some practitioners prefer applying them one at a time, and recommend the following method: — having wiped the leech dry with a linen cloth, take it between the thumb and finger by the middle, and apply its mouth to the spot selected. When first applied, it is apt to twist and extend itself, attempting to seize on some other part, but it must be repeatedly drawn back and re-applied, until it fixes upon the desired spot. When it has taken a firm hold, it may be left to the enjoyment of its labours.

In time of scarcity, snipping off the tail will allow the blood to flow through the artificial opening as fast as the leech sucks it, and thus multiply their individual means of usefulness.

Blood-letting from the Hæmorrhoidal Veins.

The patient being seated on a perforated chair, which only uncovers the anus itself, the operator stooping or kneeling, by means of a taper, sees the part to which the leech is to be applied; and, provided with a small round wide-bottom bottle with a long neck, just large enough to contain one leech, he allows the animal to crawl out and fix itself on the part intended. The operator, having applied one leech, withdraws the bottle, and proceeds to fix one after another till the desired number has been applied: a basin is placed under the chair into which the blood flows. The discharge of blood is promoted by the use of warm fomentation.

The application of leeches according to the above plan is intended for females, it being desirable not to expose the parts.

VACCINATION

Is performed with the point of a clean sharp lancet impregnated with the vaccine matter, inserted by means of a slight scratch or small puncture, and wiping the point of the lancet on the part where the blood is drawn.

With Ivory or Quill Points.—Scarify the arm, and then introduce the ichor on the point.

With Thread or Cotton.—Make a slight incision in the cuticle; in this incision lay the impregnated thread, and then bind it on the arm with adhesive plaster.

BLOOD-LETTING.

Blood-letting at the Arm.

The skin of the arm must be pressed strongly upwards, and a ligature a yard and a half in length, and three fourths of an inch broad, passed with some degree of tightness round it a little above the elbow, and continued until a proper turgescence of the veins is conspicuous, the ligature being, at the same time, tied with the slip knot on the outer side.

The thumb of the left hand is next applied on the vein an inch and a half below the place you intend to puncture; then holding the head of the lancet between the thumb, fore and middle finger of the right hand, the ring and little finger being distended to serve as a fulcrum. You bend the fingers which hold the lancet, the point of which turns towards the vessel, and by a moderate and gentle extension of these fingers penetrate into the vein, raising the point of the instrument in order to enlarge the orifice.

Blood-letting at the Hand.

Having applied the ligature at the distance of two or three inches above the point to be operated on, the hand is to be placed in a basin of warm water, and allowed to remain for a few minutes so as to render the veins tense and apparent. The largest vein is to be selected, and opened on the principle laid down in the preceding article.

Abstraction of Blood from the Foot.

Having compressed the veins by means of a piece of broad tape just above the ankle joint, the foot is to be placed in a pan of warm water, and kept there for a short time to cause a swelling of them. When this is accomplished, select one of the largest for the operation. The incision is to be made in an oblique direction. When the ligature is removed the blood will cease to flow, and adhesive plaster is the best bandage.

Sometimes it is found absolutely necessary to keep the foot in warm water during the whole time of the operation, to promote the flow of blood.

Abstraction of Blood from the Scrotum.

A ligature is put around its upper part, and the whole immersed in warm water.

When the venous distension is complete, the surgeon, sitting before the patient, supports the bag in his left hand, stretches the integuments with the thumb and fingers on either side, and opens the largest veins with a lancet.

Bleeding in the Neck from the Jugular Vein.

The head being laid on the side, the surgeon compresses the external jugular vein with his thumb, so as to make the part above it swell, and then a lancet is pushed in an oblique direction into the vessel till the blood rises up to the point of the instrument; next bringing up the front edge in as straight a line as possible, the wound in the skin will be just the same size as that in the vein. The flow of blood will readily stop on removing the pressure.

It is stated by some of the first surgical authorities, that pressure below the orifice should not be removed until a compress has been applied upon the orifice itself; otherwise the air might penetrate into the open mouth of the vein, and thus transform a slight operation into a wound suddenly fatal.

Facial Vein.

Opening the facial vein in cases of diseases of the eyes and brain is attended with very beneficial results. The opening must not be made at the lower part of the face on account of the proximity of the artery.

Ranine Vein.

In opening the ranine vein, it is better to dip the point of the lancet obliquely backwards and upwards, and at the same time incline it rather outwards than inwards.

ARTERIOTOMY.

The patient is to be seated conveniently with his head inclined against the light, and held steadily against the breast of an assistant.

When the surgeon has clearly discovered the course of the artery, let him place his two fore-fingers, or the fore-finger and thumb of the left hand at a moderate distance from each other, upon it; and in the space between the former and the latter, dip the end of a strong lancet, not too broad-pointed, — observing to enlarge the incision by elevating its point as it is withdrawn.

If blood should follow the lancet in a salient stream, and of a fine florid colour, the artery is properly opened, otherwise the incision must be repeated till the vessel is rightly opened. If the vessel be deeply seated the skin should be previously divided so as to bring it into view, and then the opening made with the lancet.

Above the zygomatic arch, the superficial temporal artery is situated, about two or three lines in front of the auricle, at which place it would be very easy to open it.

CUPPING.

In applying the glasses, they should each, in turn, be held in a slanting direction, very nearly approaching to the perpendicular. The torch should be introduced about two thirds of its depth, and then quickly, but with an easy, not a jerking motion, withdrawn, and the glass applied.

Immerse the cotton in a mixture of equal parts of æther and spirit of wine.

It should not be applied with a sudden violent impulse upon the skin, nor with too slow a motion, but suffered to drop, as it were, simultaneously with the withdrawal of the torch. The glasses, when first applied, should remain on about half a minute, or until the skin assumes a reddish purple colour, indicative of the blood being collected on the surface.

Before the glasses are applied, the part should be rubbed well with a dry cloth.

The torch should now be held in the palm of the right hand, and, to avoid the liability of its being knocked away by the springing back of the trigger, let the upper portion of the tube press against the concavity formed between the fore-finger and thumb, and confine it by the little and fourth finger, pressing upon the ring or plate; the scarificator should then be held between the thumb and middle finger, care being taken not to press too soon upon the button. To obviate the unpleasant sensation produced by the coldness of the metallic scarificator, it is advisable to pass the instrument for a moment over the flame of a lamp before using it. The forefinger being at liberty, the nail should be gently introduced between the edge of the glass and the skin, pressing slightly inwards, and the glass gently elevated and taken off in the left hand. The scarificator should then be applied, immediately before the subsidence of the tumour, flatly upon its surface. The incisions are not to be deep, especially when the object is to take away much blood: nothing is gained by going beyond the cutis. The instruments should then be placed in the palm of the left hand, confined by the little finger, and the glass re-applied, and thus, with each in succession, the glasses being repeated twice or thrice, according to the quantity of blood required over the same scarifications.

I have frequently abstracted a large quantity of blood from the nape of the neck, temple, &c. by scarifying the part superficially with a lancet, and then applying a rarefied cupping glass, a wine glass or a small tumbler.

A sufficient quantity of blood may be obtained by applying the glasses over leech bites: each glass should include five or six bites.

New York Method of Cupping.

Tin cups (nearly cylindrical, but narrowest at their mouths, and three inches high,) are placed in a basin of hot water. The operator, having either a lighted candle or a piece of paper which has been dipped in alcohol, and ignited, in his left hand, takes out the cups successively with his right hand, holds them over the flame for a few seconds, then quickly applies them on the skin at the spot selected. After the application of the scarificator the cups are again exhausted, as before, placed over the incisions, removed, washed, and re-applied, as often as is necessary.

Dry cupping is performed by applying to the diseased part the rarefied glasses, and allowing them to remain for a certain time.

THE LEECH GLASS.

Mode of Application. — A piece of lint, four inches long and three quarters of an inch wide, soaked with spirits of wine, is to be dropped lighted into the belly of the glass, or the soaked lint may first be put into the glass, and then lighted by a spill, or by a long piece of lighted wax taper. When the flame is rather declining (which will be the case in about a few seconds after the lint has been lighted), the mouth of the glass is to be applied to the skin, and the glass will fasten immediately. Having applied the glass-leech for the purpose of dry-cupping, previous to scarifying, the lint does not require to be soaked again for the second rarefaction, but only to be lighted afresh, and the mouth of the glass applied over the scarified skin, when the blood will immediately begin to flow and stream down into the belly of the glass, not being liable to coagulate on the scarifications. It is frequently necessary to blow with the mouth into the glass to supply the loss of oxygen before the lint will light a second time. By this simple operation, the deteriorated air is exchanged for that of the atmosphere. The mouths of several of these glasses may be applied close to each other, the bellies hanging down side by side.

This cupping glass is of the shape of a Florence flask, with a very short curved wide neck, the mouth being of the same diameter as the common cupping glasses. Each glass should contain from 16 to 20 ounces of fluid. — Inv. by Dr. Fox, of Derbyshire.

EXTRACTION OF THE TEETH.

Extraction of the great and small Molar Teeth.

The patient must be seated in a chair opposite a clear light, with his head supported by an assistant. The operator, placed opposite to him, holds a key, the pad or fulcrum of which is covered with lint or leather, between his fore and middle finger of the right hand, in such a manner that the handle of it is completely held with the palm of the hand.

Having previously separated the gums from the neck of the tooth on both sides, the operator presses the claw as far down between the tooth and gum as possible, and in this situation it must be firmly fixed and retained by the fore-finger of the left hand, while the pad or fulcrum must not be placed more than a quarter of an inch below the upper body of the gums on the opposite side of the tooth. The operator now turns the key with sufficient force, so as firmly to fix it upon the tooth, turning his hand round, and, at the same time, raising it, by which he gives the twist at the same instant. In extracting the tooth, you must observe that, if you turn your hand with sufficient force, grasping the tooth firmly, and elevating your hand at the same time, the tooth must rise from its socket; but, whenever it is found to be very firmly fixed, and especially if it be one of the large molares, it is better after it is freely loosened to remove the instrument; and, having turned the claw to the opposite side, to apply it so as to turn the tooth to the other side of the jaw, by which it will be rendered so completely loose, as to be easily taken out with the common teeth forceps.

If it be an upper tooth, the thumb maintains the claw in lieu of the fore-finger.

Extraction of Incisors of the Upper Jaw.

The patient should be seated in a chair opposite the window, while his head should be supported by an assistant standing behind.

The operator takes hold of the tooth with the straight forceps as high as the alveolar process will admit, and presses it so firmly as not to allow the blades to slip, at the same time taking care not to crush the tooth. He then makes slight rotatory movements from right to left to loosen the tooth, and draws it downwards in the direction of the socket.

Extraction of Incisors of the Lower Jaw.

The patient being placed as in the preceding case, the operator fixes the blades of the hawk's bill forceps as low on the neck of the tooth as possible. A gentle, but firm movement, is to be made forwards, so as just to separate the tooth from the back part of the alveolar socket, and then continuously with this motion, the tooth is at once to be raised out of the socket.

Excision of the Crown of Teeth.

The patient being seated as in the preceding case, the cutting forceps are to be carefully fixed on the neck of the tooth; the edges of the instrument should be held parallel to the edge of the gum, and should be made to press it down a little in order to get at the neck, about a line below the usual height of the gum. The handle of the forceps are then pressed gradually, but firmly together, and, in a moment, the upper part of the tooth snaps off.

Toothache.

Extract the tooth as directed at page 9., and remove the sixteenth of an inch from the lower portion of the root with a sharp three-sided file. If the hole in it be not large, plug it well with leaf-gold, and as soon as the socket is cleared of the blood, replace it. It will be as firm and as useful as before.

This plan succeeds best with the incisores and canine teeth.

Stopping Decayed Teeth.

A sufficient quantity of gold is to be applied at one time to complete the stopping of each tooth; for, when small pieces are used at first, and the deficiency supplied by a second portion, the latter will be liable to be removed by the food in mastication. The gold is to be forced by degrees into the tooth, taking care that the first part is placed in contact with the bottom of the cavity, and that every succeeding portion is firmly pressed against that which preceded it, so that every irregularity of the excavation shall be filled. Any superfluous metal is then to be cut off, and the surface polished with a little steel burnisher.

Loose Teeth.

When the teeth happen to be loosened by blows, the sockets themselves are always injured. If the tooth be entirely forced out, it must be washed with milk-warm water, and returned into the socket, pressing it well down to the bottom, and fastening it to the two adjacent teeth by a thread of silk, or any other soft substance. The socket is then to be carefully pressed round the root of the tooth, and every loose tooth must be treated in the same manner.

Transplanting of Teeth.

The transplanted tooth ought to fit the socket exactly. For this purpose it may be filed down, if it happen to be too large, avoiding, however, the corona of the tooth as much as possible. The transplanted tooth ought also to be taken from a person of a good constitution.

Hæmorrhage arising from the Extraction of Teeth.

Take a small fine vial cork of a size adapted to the socket from whence the tooth has been extracted, and the hæmorrhage proceeds. Then with a small dossil of lint wet in Tr. Benz. comp., and put on the smallest end of the cork, push the cork into the bleeding orifice, pressing it firmly in till it be, as it were, wedged in the socket, and keep it there as long as may be necessary, desiring the patient to further press against it with the teeth of the opposite jaw till the bleeding be stopped, which is almost instantly; or replace the ejected tooth, which will answer the same purpose.

Another Method.

Macerate a small piece of Indian rubber in spirits of turpentine for ten minutes; take it out of the fluid, and expose it to a current of air for a short time, so as to dry it; then mould it with the fingers into a conical shape, and press it into the alveolar cavity from which the tooth has been extracted.

Lancing the Gums in Children.

The child being placed horizontally with its head resting on the operator's knee, its hands secured by an assistant, and the lower jaw depressed and held firmly, the edge of the instrument is made to traverse the gum, covering the tooth by an incision sufficiently deep to reach it, which must be so distinctly felt by the operator as to satisfy him that nothing interposes between the lancet and it.

Some recommend the incisions to cross each other on the tooth, in the shape of an X. The incisions should be made less freely on the inside than the outside of the tooth; for, as the rudiments of the second set of teeth are placed in the jaw within the circle of the first set, a deep incision in that part might be injurious.

METHOD OF APPLYING STRIPS OF PLASTER.

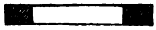
Before the strips are applied, the surface should be shaved and dried, and the wound properly cleansed. The surgeon then carefully approximates the lips of the solution of continuity with the palms of both hands extended.

The wound being large, say, for instance, a stump, he begins to lay on his hands at some little distance from the edges of the division; then presses lightly and slowly so as to bring the deep-seated parts as nearly as possible into contact, at the same time that he covers them with integuments, sedulously guarding against giving pain. In this way, the radial edges of either hand come together in a parallel manner, and will contain between them the injured edges of the solution of parts. An assistant having warmed the first strip, which he holds lightly by its ends, first applies one half of the integuments, passes over the wound, and fastens the other half by slight pressure with the flat of his fingers. In this manipulation, it is important that there be a perfect correspondence between the actions of the surgeon and of his assistant, so that their hands may never strike against each other in meeting, and that the adhesive strip may keep the parts together, as the fingers of the surgeon are removed to make way for it. At the moment that the plaster passes over the wound, the surgeon ought to support and prepare for contact that side to which the strip has not yet adhered, so that when allowed to recede, the parts may be in perfect co-aptation.

The first plaster must always be applied to the middle part of the wound; then a second and a third are laid on either side of it, and others successively, until the angles of the wound are arrived at.

Strips are not always placed perpendicularly. They may be put on obliquely in different directions, according to the necessity pointed out by the extent, regularity, or irregularity of the wound.

Mr. Liston recommends as a substitute for adhesive plaster slips of riband or linen coated with a strong alcoholic solution of isinglass — a stiff solution of parchment size will answer equally well.

The strapping I have been in the habit of using for years with decided benefit, in amputations and wounds of every description, is made in the following manner. I take linen or cotton cloth, of whatever length it may be, and spread one third of its width with adhesive plaster, leaving the central two thirds free, thus  The plaster so formed is to be cut into straps, and applied in the usual way, by which means the free surface of cloth is brought in contact with the raw edges of the wound. By this I am enabled to apply water, or any liquid I please, to the face of the stump or wound; the edges of it, as well as the parts surrounding it, are not mutilated with the plaster, the removal of which frequently creates great distress, and sometimes produces erysipelatous inflammation in decayed constitutions.

Removal of adhesive Strips.

Mr. Hutchinson, in removing the strips of sticking plaster, commences by reflecting the raised end of the strip close down upon the adhering part, and then bringing it gently forward with one hand, whilst the removing part of the strip is followed by two fingers of the other, placed upon the skin: this will prevent the delicate adhesions from being torn asunder: when one end is detached from its adhesions as far as the line of incision, in like manner, the other end is brought down and the strip wholly removed.

Dr. Ballingall recommends the raising both extremities of the plaster at once, pulling towards the centre, so that the part covering the line of the wound may be the part last disengaged.

BANDAGES.

The uses of bandages are various. To retain the dressings of wounds, ulcers, &c.; to keep divided parts in contact; to compress blood-vessels; and restrain hæmorrhage; to support weak parts; to promote absorption, or rather to limit deposition; to destroy preternatural growths; to repress inflammation, and to support the parts and apparatus in the treatment of fractures, &c. &c. &c.

The simple Roller.

In applying it to the upper extremity the surgeon begins at the wrist, and in the lower extremity at the ankle, carrying the turn first to the points of the fingers or toes, and then returning upon the limb. It should be rolled outwards spirally, laying one turn over the other one third of its breadth, and wherever it becomes slack from the varying circumference of the limb, or wherever the surgeon wishes to increase the pressure, he makes a reverse, or twist, with the roller, fastening it with a pin at that point, taking care to make all the reverses upon the outer part of the limb.

Bandage of Scultetus, or that of separate Strips.

It consists of many separate bands, each two inches and a half wide, and so long as to go once and a half round that part of the limb to which they are to be applied.

Cover one or two pillows with a large napkin; place on it the strips of cloth, and slip the whole under the diseased limb, which is suitably supported by assistants. The application of the bandage begins with the lowest strip. It is proper that the bandage should be moistened by passing a wet sponge, or cloth, over each piece. The surgeon who stands on the outer side of the limb then takes hold of one end of the strip, which is held tense at the other end by an assistant, and applies it perfectly flat, crossing the axis of the limb obliquely. When he has reached the opposite side, the free tail will very often, from being too long for the size of the part, form irregular wrinkles underneath, which, upon pressure from the superincumbent limb, would be very painful. To avoid this, pull upon the free end of the tail with the left hand, and depress the pillow, so as to allow the fingers of the right hand to pass the band underneath the limb, after which, the end folded under is raised laterally: then, taking the second tail of the bandage from the hands of the assistant, apply it in the same way by crossing the first tail obliquely; then lay down successively the other strips, the second covering the first for one third, or one half of its width, the third covering the second, and so on up to the top of the limb, always going from below, upwards, or in an opposite direction to the formation of the apparatus.

The T *Bandage*

Consists of a piece of linen, or a transverse band of width and length proportionate to the size of parts to which it is applied, and upon which is sewn the end of another piece which intersects the former at right angles.

If the breast or belly be wounded, we make the transverse piece which encircles the body very broad, and having split the tail part into two portions, one of these is to be conveyed over each side of the neck, and pinned to the opposite part of the circular bandage, so as to form a suspensory for the latter, and prevent its slipping down. If we have a wound, or disease, or operation near the groin or private parts, the transverse piece which is to encircle the pelvis is smaller, while the tail part is made very broad. When the disease is in the private parts, perineum or anus, the tail is split according to circumstances; but when the disease is in one groin, the tail part of the bandage is allowed to remain entire.

Split-cloth Bandage.

This consists of a piece of linen a yard long and a quarter of a yard wide, split at each end to within three fingers' breadth of the centre, into three or four portions.

The middle, or unsplit portion of cloth, is applied to the middle of the head. The two anterior tails go round the temples, and are pinned at the occiput; the two posterior tails go also round the temples, and are pinned over the forehead; the two middle tails are to be tied under the chin.

Spica Bandage.

A single or double-headed roller, five or six yards in length and three in breadth, is used for the purpose.

Axilla.— Place the middle of the bandage under the sound axilla, carrying one head obliquely across the breast, and the other in like manner across the back. Make them cross each other over the diseased shoulder. Carry them under the axilla of the same side, cross them again, bring them up once more over the same shoulder, cross them again, and carry one head of the bandage along the breast, and the other head along the back to the sound side; return by the breast, and back to the affected shoulder; here cross the bandage as at first, then carry the two heads under the axilla; and returning to the shoulder, proceed in this manner till the bandage is expended.

Groin. — Two circular turns are first taken horizontally around the pelvis, below the cristæ of the ilia, going, as it regards the patient, from right to left, and from before backwards. The bandage, if it is to envelope the left groin, having reached the top of the pubis on that side, the centre of the band is successively directed upon the groin; the trochanter major, under the fold of the nates and of the thigh, the band is brought back in front of the groin; crossing the first turn, the pelvis is again surrounded by an horizontal turn, then the thigh by an oblique turn so as to describe the figure of 8, the left groin being the point of intersection.

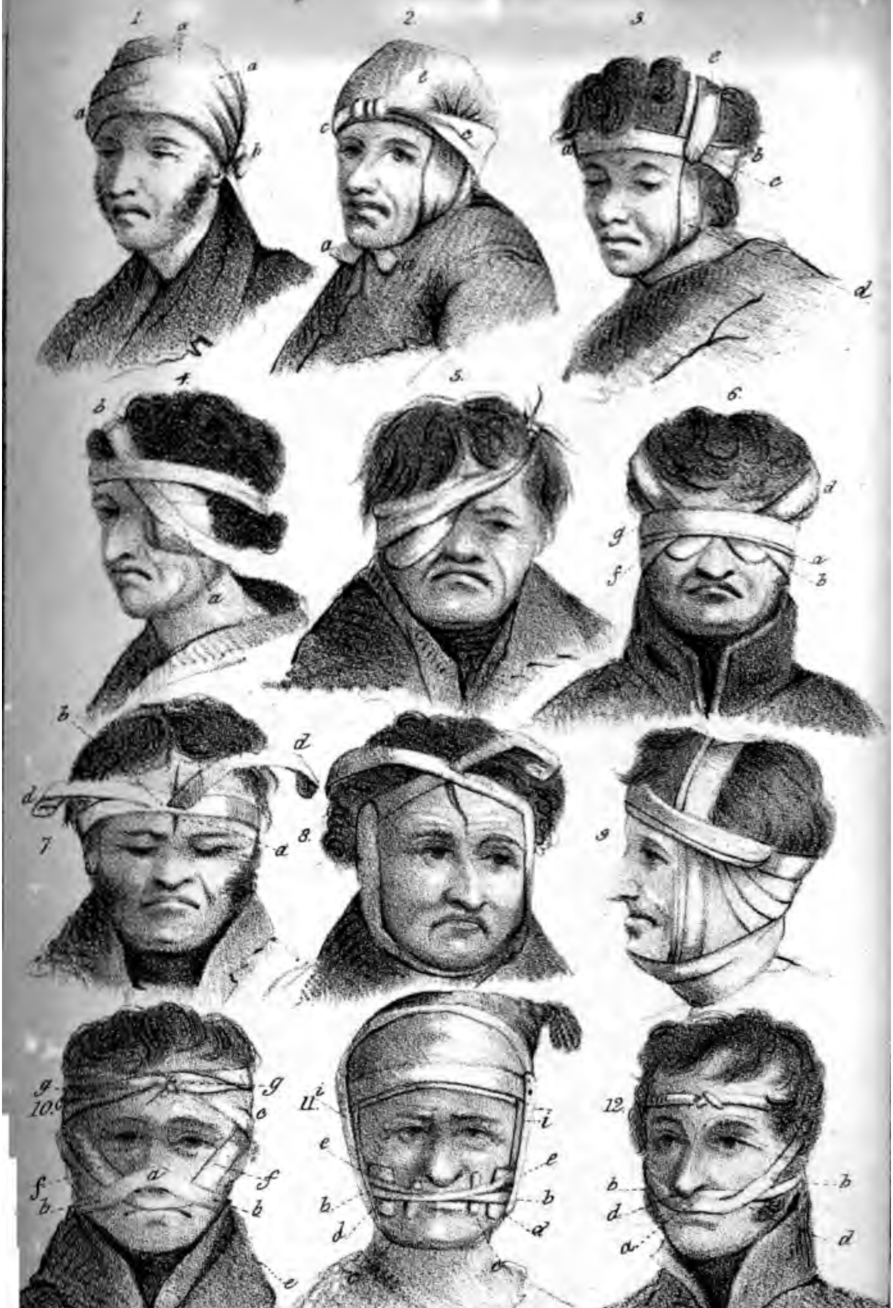
Nodose Bandage

Is a double-headed roller made of a fillet four yards long, and about an inch and a half broad. It must be reversed two or three times, so as to form a knot upon the part which is to be compressed.

PLATE I.,

Fig. 1., shows the triangular or simple kerchief for the head (couvre chef en triangle).

Plate 1



Schenberg lith. W. P. Cocks delt

a a a The parts of it which invest the forehead, vertex, and part of the occiput.
b Its corners tied upon the occiput.

Fig. 2., represents the manner in which the grand kerchief, or six-angled bandage is applied.
a a a Its middle corners tied under the chin.
b One of its anterior corners, which, with its fellow, is carried round the occiput and fastened on each side near the ears.
c c The posterior angles brought from the occiput to the forehead, and there fastened by the knot *d*.
e e The middle of the bandage investing the head.

Fig. 3.—Bandage for arteriotomy in the temple.
a b The first round made by the two roller heads, the middle of which, being applied upon the sound temple, is brought round in the direction *a b*, and crossed upon the compress on the divided artery *c*, so as to form a knot; after which they pass round the head in the opposite course *d e* under the chin, and over the top to the sound temple, where they cross again as before at *c*.

Bandages for the Eyes.

Fig. 4.—Bandage (monoculus) for the binding up of one eye.
a a Denote the first round which passes from the occiput round the ear and cheek over the left eye, and then over the forehead *b* to its beginning at the occiput.
c c c The circles about the temples where the bandage terminates.

Fig. 5.—The monoculus formed of a handkerchief rolled up and tied obliquely about the head.

Fig. 6.—The binoculus for investing both eyes applied by bringing the bandage from the forehead to the occiput in the direction *a b c* over the left eye and crossing on the occiput; it then covers the right eye in the course *d e f*, returning to the occiput, and is finally spent in the circular turns *g g g* over both eyes.

Fig. 7.—Demonstrates the uniting bandage of the forehead.

a The longitudinal wound.

b The slit in the bandage upon the wound, through which its other part *c* is passed.

d d The two heads of the bandage, by drawing which the lips of the wound are approximated, and then they terminate circularly about the head.

Fig. 8.—Represents the uniting bandage applied to a longitudinal wound near the top of the head.

Fig. 10.—Shows the method of applying the sling for the nose.

a The aperture in the middle of the bandage, which intercepts the orbiculus of the nose.

b b The two upper heads, which being carried round the temples and occiput are tied upon the forehead *c c* by the knot *d*.

e e ff g g Denote the same with respect to its two lower heads.

Fig. 11.—Desault's bandage for hare-lip operation.

a Nightcap.

b Turns of the bandage fixing all the dressing.

c c Two small compresses, one on each side of the wound.

d d Thick compresses intended to push the cheeks forwards.

e e A portion of the uniting bandage passing over the compresses of the lips, and upon those of the cheeks.

i i Small bands sustaining the compresses of the cheeks.

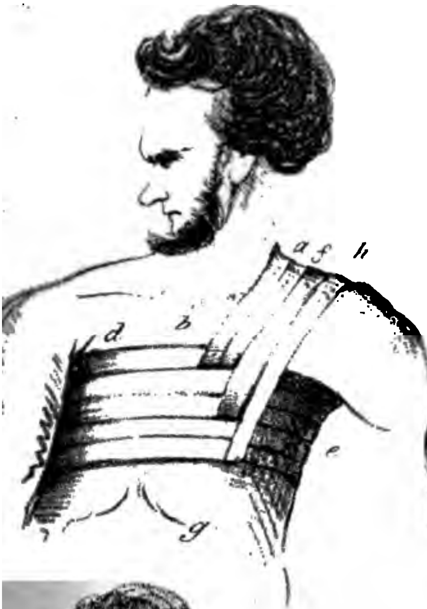
Fig. 12.—The method of applying the bandage for the upper lip.

a Its middle, which is not slit.

b b Its two upper heads, which are tied upon the forehead at *c*.

d d Its lower heads, which being carried up over

Fig. 3.



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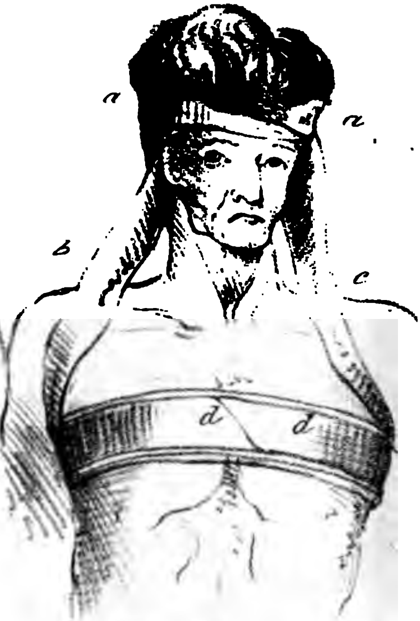

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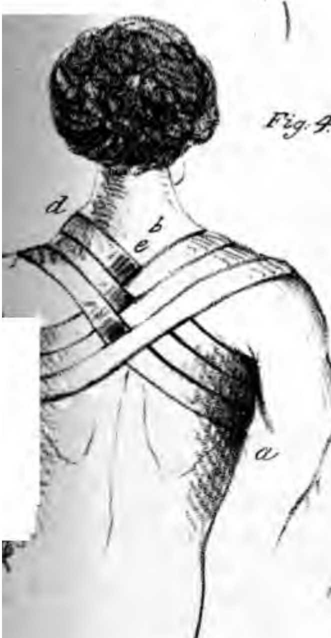

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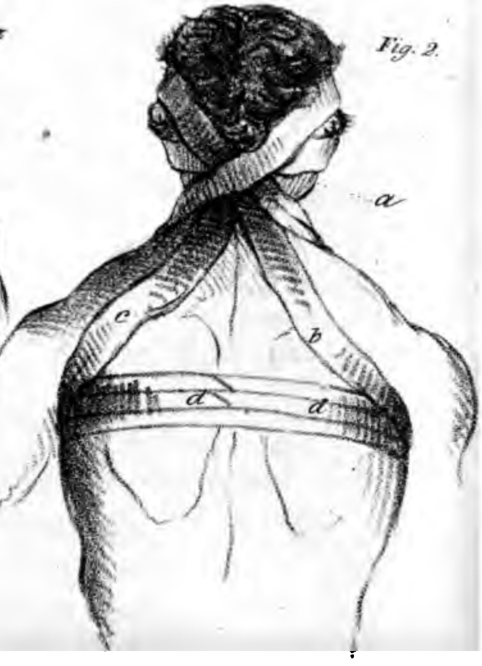

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the cheeks *e e* are crossed upon the occiput, and then fastened by a knot upon the forehead.

PLATE II.

The dividing bandage viewed on the fore part of the body.

Fig. 1.—*a a* The circular turns investing the head where it begins.

b c The turns which pass under the right and left axilla to the back, where the roller heads change hands, and are then conveyed circularly about the thorax *d d.*

Fig. 2.—Represents a posterior view of the same bandage.

a The place where the roller heads traverse each other like an X.

b c The turns which go under each axilla.

d d The circular rounds which invest the thorax, and change their courses upon the back.

Fig. 3.—Bandage for a fracture or dislocation of the clavicle, which is made of the double-headed roller.

a b The first progress of its anterior head.

c d e The circular rounds about the thorax made by its posterior head, which, riding over the former, binds it down tight before it is reflected back in the series *f g h.*

Fig. 4.—Bandage for the clavicles and scapulæ. It may begin under the axilla *a*, and forming its first course *a d* over the left shoulder, and under the same axilla *c*, traverse its first course at *e*, and passing over the left shoulder *d*, pass again under the same axilla at *a*, and so on as before.

You may also begin this bandage above either of the shoulders at *b* or *d*, as well as under the axilla *a c.*

Application of the Truss.

When a proper truss is provided, it is necessary that the patient should be well instructed in the use of it, and his medical attendant should superintend the use of it till the patient is able to manage it himself. The rupture should be completely reduced, and the truss so applied that the lower edge of the pad may lie even with the superior edge of the os pubis: if it be placed higher than this, the rupture will descend; if it be placed lower, the soft parts will be compressed between the truss and the pubis, and much unnecessary pain occasioned. If, upon careful inspection, the truss seems to fit accurately, we should not be discouraged, if the rupture should descend some time after the bandage is put on; for it frequently will happen, when a patient has not worn a truss, that, on its first application, the rupture will descend in a short time: it must then be returned, and the truss replaced. If, upon a repetition of this for some days, however, the rupture be not perfectly retained, it may safely be concluded that the truss is deficient in strength, and a stronger must be provided. If the truss should excoriate the parts it lies upon, it must be remedied either by some topical application, or by interposing some soft substance.

A patient should never be without his truss, either in or out of bed; particularly those who are troubled with a cough.

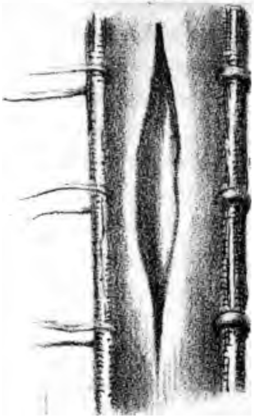
PLATE III.

SETON, ISSUE, AND SUTURES.

Fig. 1.—Making a seton.
  The seton needle passing through a fold of skin in the nape of the neck.
Fig. 2.—Making an issue.
  a A fold of skin over the part where the issue is to be made.
  b A lancet thrust through the fold.
  c c Fingers pinching up the fold.
Fig. 3.—The interrupted suture.

Plate

Fig. 5.



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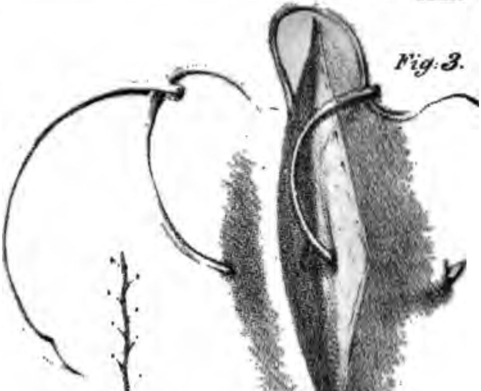

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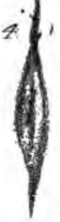

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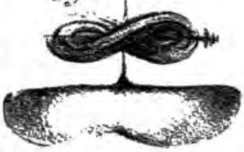

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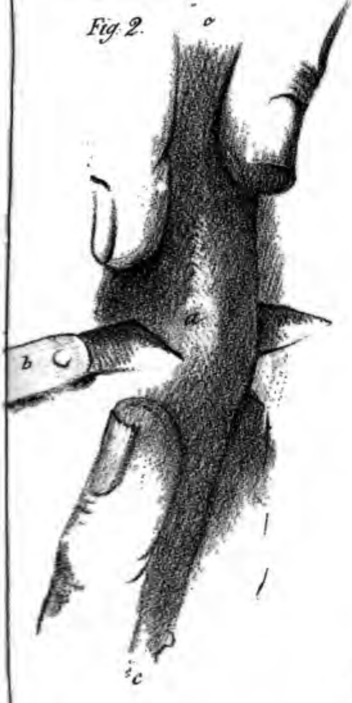

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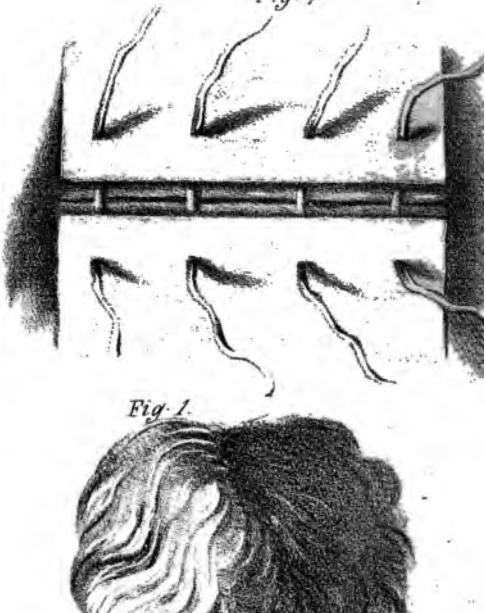

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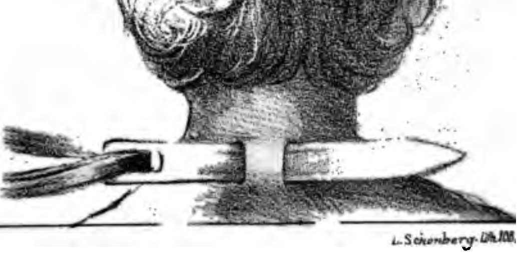

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Fig. 4.—The glover's suture.
Fig. 5.—The quilled suture.
Fig. 6.—The twisted suture.
Fig. 7.—The dry suture.

CUTTING AN ISSUE.

With the thumb and forefinger of the left hand pinch up a fold of the skin; then with a lancet held in the right hand, cut through the spot required in a transverse direction, bearing the blade upwards and outwards. In fat subjects, the operation is performed by plunging the point of a strong-bladed lancet through the skin after the manner of bleeding, then bearing it forward, upward, and outward, so as to make the orifice large enough to hold a pea or horse-bean.

Issues should never be made over a tendon, bone, belly of a muscle, or near a large blood-vessel. Interstices of the muscles, as about the nape of the neck, the middle of the humerus or thigh, or between two of the ribs, are proper situations for them.

CAUSTIC ISSUE.

A piece of leather is to be spread with adhesive plaster, or adhesive plaster on cloth, and a hole is to be cut through it of the size and form of the intended issue. This plaster is to be warmed, and applied to the skin in such a way that the hole cut through it may be on the part where the issue is to be made; this hole is to be filled up with paste caustic, and covered by adhesive plaster to prevent it from falling off. The caustic is to be left on until it destroys the skin, which will generally be found black and gangrenous in an hour and a half or two hours; but if not, it must be re-applied, and allowed to remain still longer.

The lapis infernalis must be reduced to a paste with a little water or soft soap.

SETON.

Pinch up a thick fold of the skin as before directed, and pierce this fold to a greater or less extent with the common seton needle armed with silk, cotton, or India rubber.

If no seton needle be at hand, puncture a fold of skin with a common lancet, and then, by means of an eyed probe, a skein of silk or thread can be passed through the wound.

An inch or two of the substance introduced must always be left, in order that the seton may be so dressed, that there can be no danger of its being withdrawn.

Seton for Bronchocele.

The skin being made tense, pass a straight, long, and narrow needle, armed with three or four threads of silk, through the tumour. The portion of gland included within the ligature must not be more than one third of its whole bulk.

Seton for White Swelling.

Pass a slender needle, in length twice the diameter of the knee, armed with six or seven silk threads, under the tendon of the patella, and across the joint.

Interrupted Suture.

A needle being put upon each end of the same thread well waxed, each needle is to be inserted at the bottom of the wound, and pushed outwardly so as to pass out at a proper distance from the edge of the wound; the needles are then to be taken off, and the threads allowed to remain till all the ligatures are passed, which the extent of the wound requires. This being accomplished, the edges are to be brought together, and supported by an assistant till all the ligatures are firmly fixed.

John Hunter says, the dry suture has an advantage over stitches, by bringing a larger surface of the wound together;

by not inflaming the parts to which it is applied; and by neither producing in them suppuration nor ulceration, which stitches always do.

When parts, therefore, can be brought together, and especially where some force is required for the purpose, from the skin not being in large quantity, the sticking-plaster is certainly the best application.

Quilled Suture.

For this purpose, the thread, when passed in the interrupted suture, is to be made double, so that the quill, or plaster rolled up in the form of a quill, may be inserted in the doubling of one side, and the knot made to pass on the quill on the other.

Twisted Suture.

The divided parts are to be brought nearly into contact by the fingers of an assistant, leaving just as much space between the edges of the wound as to allow the surgeon to see that the pins are carried to a proper depth. This being done, one of the pins, either silver or gold, with a steel point, must be introduced through both sides of the wound by entering it on one side externally, pushing it forwards and inwards to within a little of the bottom of the wound, and afterwards carrying it outwardly through the opposite side to the same distance from the edge of the wound that it was made to enter at on the other side.

The distance at which the pin ought to enter the wound must be determined by the depth of it, and by the degree of retraction produced in the divided parts. After placing the edges in contact upon the pins, a ligature is to be twisted round each, so as to form a figure of 8.

If the pins be well oiled, they will be found to enter very smoothly, and with less pain.

A New Method of keeping the Edges of Wounds in Contact.

Pass a threaded needle first through the lower part of the edges of the wound on each side, and then in like manner, without cutting the thread, through the upper part of each. By this means, a loop of thread will be left between the two points of suture on one side, and the two ends of the thread on the other, which, when tied together, form a similar loop.

The loop of one side being passed through that of the other, both are carried to the back part of the head and fixed there, and the edges of the wound, by this means, kept in contact.

Dry Suture.

The method of making the dry suture is by means of two slips of adhesive plaster running along the sides of the wound, at some small distance from the lips, each of the plasters being furnished with strong threads or strings, one for each inch of wound: by tying these, the lips of the wound will be drawn into contact, and retained, with more or less force, as the strings are tightened or slackened.

THE MODE OF APPLYING MOXA.

The moxa is formed by immersing either surgeon's lint or fine linen in a filtered solution of nitrate of potash; to make the solution, dissolve one drachm of the salt in four ounces of distilled water. When the moxa is to be used of a small size, fine linen will answer; but when large, lint is preferred.

The substance must be perfectly dry before it is folded up; and in folding it, a proper degree of firmness must be given, which experience will soon teach. After it has been rolled up, and fastened with two or three stitches of the needle, its end should be cut with a very sharp knife to make it perfectly level, and thus secure its application to every part of the skin upon which it is placed. Its length should be about three fourths of an inch, and its diameter may vary from a quarter of an inch, to an inch.

A small hoop is made of silver wire to hold the moxa, the size of it corresponding to the size of the moxa; the ends of this hoop are grasped in the forceps, which are tightened on it by a screw three fourths of an inch from their point. The hoop should be applied about a line distant from that end of the moxa which is to touch the skin: this precaution is necessary to prevent the hot wire from coming in contact with it. In fixing the ends of the hoop in the forceps, such an angle or inclination of the moxa should be given as will be found most convenient for the exact application of it to the part affected. A common pair of dressing forceps will answer the purpose.

The surrounding parts are to be protected by paper wetted in a saturated solution of alum or sulphate of soda, leaving a hole in the centre exposing the part to which the moxa is applied.

The size of the moxa, the manner in which it should be applied, and the length of time it should be allowed to remain on the part, must be regulated by the depth of the disease, and the nature of the parts. Great irritation is produced by holding the moxa in the forceps as close to the part as the patient can bear; at the same time, it should be moved slowly over the surface, backwards and forwards, until combustion has terminated.

One end is lighted in the flame of a candle, or with a live coal; the opposite end is moistened with a little saliva, and placed on the selected spot upon the skin.

Vesication.—The moxa is applied by holding it steadily, and as close as possible to the skin, without allowing it to touch it, and until the skin appears white, which appearance is owing to the detachment of the cuticle, and the formation of a blister.

Superficial Eschar.—The moxa must be placed on the skin, and allowed to remain on until the skin appears brown under it, which will in general be found to take place when the combustion of the moxa has extended to the distance of about a line from the skin.

Deep Eschar. — The moxa must be allowed to remain on until its combustion is complete, when the part upon which it was placed will be found black, and the surrounding skin slightly red and wrinkled.

Another Method.

A small quantity of fine gunpowder is to be strewed on the part, or placed in a plate under the part, and ignited with a lighted match. The extent, as well as depth, of the eschar is determined by the quantity of gunpowder used.

Moxa and Acupuncture Needle.

Perforate a moxa, of a proper size, with a needle of such length as will be sufficient to reach to the seat of the disease, and at the same time extend so far beyond the surface of the skin as to keep the moxa about one inch from it, or so far as to secure the texture of the skin from injury; the needle is then carried to the seat of the disease by the port-aiguille, and as soon as it has been introduced the port-aiguille is removed, the needle being left in the part. The moxa, which had been previously perforated, should be now placed in a state of combustion on that end of the needle which projects beyond the surface of the skin, and allowed to burn round the needle by which it is thus transfixed. The heat disengaged from the moxa is communicated to the needle, and thence conveyed to the seat of the disease. When the needle has cooled, it is removed, and the wound or eschar produced by it is scarcely perceptible.

BLISTERING.

Immerse the instrument (a small plate of polished iron) in boiling water until heated to a temperature of 212°; then having covered the skin intended to be blistered with a piece of silk wetted in warm water, the instrument is firmly pressed against it for three or four seconds.

The first effects of the application are a corrugation and paleness of the skin, but the red blood soon returning, an inflammatory redness appears, and gradually proceeds to discharge serum, and to detach the cuticle. Dress the wound with any mild cerate.

Another Method.

Dip a piece of linen, the size of the blister required, in alcohol, and then, having dried it slightly, so that it may be wet without dropping, apply it to the skin, passing a lighted match over the surface: the spirit fires, but the linen is not ignited if there be not a current of air playing on it. To avoid burning the linen, the flame should arise perpendicularly, and, therefore, the surrounding parts should be covered with a wet rag. It is extinguished in a quarter of a minute. One application destroys the epidermis, and detaches it, and two or more will form an eschar on the dermis.

ACUPUNCTURATION.

The needle is held between the forefinger and thumb of the right hand, pushed gently and almost without pressure into the seat of pain, to the depth of from half an inch to an inch, or something more Several may be applied at the same time, allowing a small distance between each.

The number of needles passed in varies according to the severity of the disease; but the more, perhaps, the better, if they be put close together. They are left in, generally, from an hour and a half to two hours, but sometimes five minutes will suffice; whilst at others, 24 hours elapse before their withdrawal. In extracting them, it is well to rotate them a little, and to support the skin with the thumb and forefinger, brought close to the base of the instrument.

ELECTRO-PUNCTURATION.

The needle is introduced into the pained part, and its head is brought in contact with the wires of a Voltaic pile.

Plate IV.

INCISIONS AND PUNCTURES.

Fig. 1.—Free incision of a carbuncle with a scalpel.

Fig. 2.—Opening an abscess.

The head of the lancet is held between the thumb, fore and middle fingers of the right hand, the ring and little fingers being distended to serve as a fulcrum; you bend the fingers which hold the lancet, and, by a moderate and gentle extension of these fingers, you penetrate the tumour, raising the point of the instrument in order to enlarge the orifice.

Fig. 3.—Dilatation of the sinus upon the grooved director.

a The external opening of the sinus.
b The grooved director.
c The bistoury.

Pass a grooved director into the sinus to the required depth; on this, introduce the point of a straight or curved bistoury; slide it along the groove as far as the cul-de-sac, cutting from within to without by raising the handle of the knife to an angle of 30°.

Another Method.

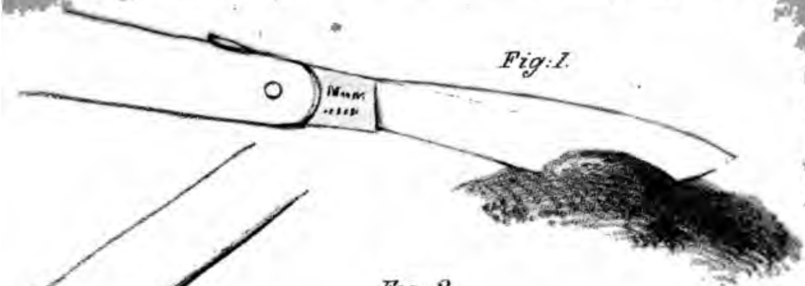
Introduce a long probe, armed with silk, into the sinus, and carry it through the other end, or, if it terminate in a cul-de-sac, the probe must be pushed onwards until the end of it is felt at the extremity of the sinus: an incision is then to be made directly on the point of the probe, which is allowed to pass, carrying the cord after it.

Fig. 4.—Opening a large abscess with the trocar.

Puncture the tumour with a small trocar; withdraw the stylet, and allow as much matter to pass through the canula as it is prudent to draw off; then withdraw the latter, and close the wound.

Fig. 5.—Crucial incision.

Plate 4.



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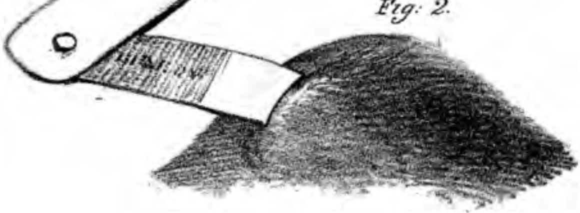

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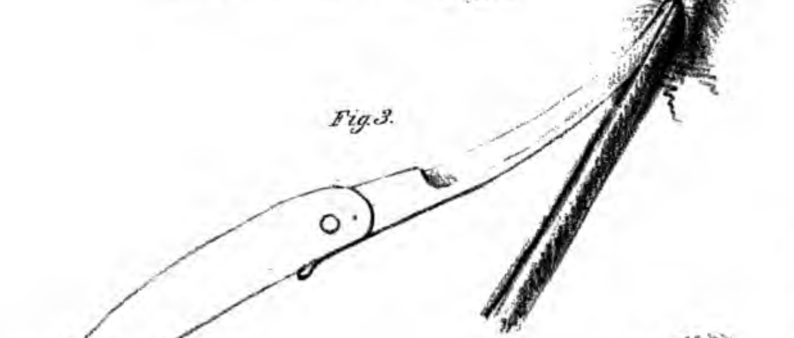

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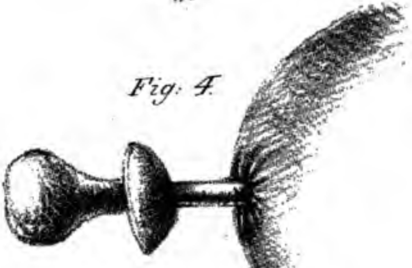

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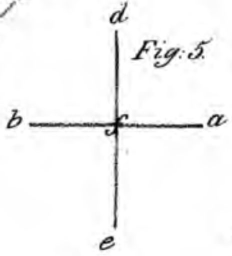

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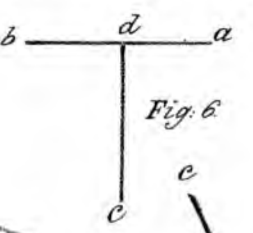

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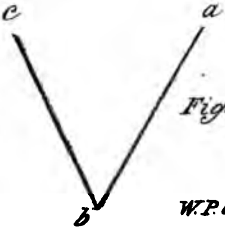

Fig: 7.

Fig: 8.

W. P. Cooke del.

The first incision passes from *a* to *b*; the second from *d* to *f*; and the third from *e* to *f*.

In making an incision with the scalpel or bistoury, the pressure should be light, so as to allow of its being drawn quickly across the integuments. The skin also should be made as tense as possible, which is effected by placing the ulnar edge of the left hand on the integuments to be operated on, so as to stretch them horizontally, while the fingers and thumb extend them in the opposite direction. This being accomplished, the surgeon takes hold of the blade of the knife near the handle with the middle finger and thumb: the forefinger, being free, passes readily either along the flat or back of the blade, from point to heel; whilst the annular and little fingers, applied to the handle, fix it in the hand: he thus makes an incision through the stretched integuments, covering the diseased part. In the second position, the knife is held somewhat similarly to a writing pen, and its edge is presented in a similar way with the above.

Fig. 6.—T-incision.

The first incision passes from *a* to *b*; the second from *d* to *c*.

Fig. 7.—V-incision. The first incision extends from *a* to *b*; the second from *c* to *b*; that is, supposing the apex to be downwards: when the base is downwards, the incisions are to be made from the apex.

Fig. 8.—Elliptical incision.

The incisions are made from *a* to *b*, that is, cutting from left to right.

Acute Abscess.

Puncture the abscess with a common lancet at the most prominent point, where the skin is thinnest, and make an opening sufficiently large to evacuate the matter.

Chronic Abscess

Should be opened before it has attained a large size; its contents discharged through a small puncture; and healed by the first intention.

The inexpediency of opening an abscess at the most depending part arises from the distance between the matter and the skin; for, if the abscess be pretty deeply seated, and points at a part superior to its seat, which it sometimes does, from the parts above more easily giving way, it will be proper to open it where it points; for instance, if an abscess be formed in the centre of the breast, and opens at the upper part, (which is often the case), it would be improper to cut through the lower half, to allow the matter to pass that way, although it may make its way there afterwards.

Abscess of the Antrum.

Extract the second molaris tooth; and if no communication with the antrum, by discharge of matter, appear, the head of the patient being laid back on the knee of the surgeon, a small trocar may be put up through the socket of the tooth till it enters the cavity, when a discharge will immediately follow.

The fore-finger should be firmly pressed against the side of the trocar during its passage, at a proper distance from the point, to prevent its being suddenly driven upwards against the orbit.

And after the matter is removed, the opening is to be preserved by inserting a plug into it, by means of which an injection may be occasionally thrown up, to wash away the matter that collects in the cavity.

The plug may be removed from time to time, to allow the matter to run out, and to admit injections to be thrown up occasionally into the antrum.

Milk Abscess.

When suppuration is established, if the abscess should not speedily open, a puncture may be made with a lancet, and the matter evacuated, if the collection be small; but if the quantity be large, not more than one or two ounces must be allowed to flow: a piece of lint is to be applied to the orifice, and, for this time, stop any further discharge. At the end of three or four hours the dressings are to be removed, and a fresh quantity allowed to escape; and so on until the whole has passed. Sometimes the discharge from the wound is arrested by a portion of dead cellular membrane getting into the orifice. When this happens, it should be removed by taking hold of it with a piece of rag interposed between the thumb and finger. Should this, however, occasion pain, or bloody discharge, it must not be continued, but the external portion cut off close to the breast by a pair of sharp scissors, and the portion in the orifice pushed back by the end of a probe, and kept by this means from obstructing the wound until a sufficient quantity of pus be extracted.

The Seton Operation.

Pass a probe along the sinus as far as it will go: let the point be carried towards the side it most inclines to: when the probe has passed as far as it can along the sinus, the point is urged laterally until its point is observed pressing against the skin without. At this point it is to be cut upon, and the probe forced so far through this little wound, as to enable the operator to seize it, either with his thumb and finger, or with a pair of forceps. The probe, previously armed with a portion of braid, soft half-inch tape, a piece of silk riband, or a slip of India rubber, is now to be drawn through.

For deep-seated suppuration of a portion or portions of the mammary gland, accompanied with a sinus.

Abscess of the Liver.

Expose the peritoneum by making an incision two inches and a half in length, cautiously through the integuments and muscles of the side immediately covering the apex of the tumour: the fluctuation of the abscess being felt, an abscess lancet should be introduced, and the tumour laid open to the full extent of the external wound.

Lumbar Abscess.

Puncture the swelling with an abscess lancet; let out as much of the matter as may be thought prudent, and then heal the wound by the first intention, by means of adhesive plaster. In this way the cavity of the abscess will be kept undistended, and will gradually contract till its entire obliteration is accomplished.

Sir B. Brodie prefers free openings, and the subsequent application of a poultice, in order that the matter of the abscess may drain out.

Abscess of the Lachrymal Gland.

Make an incision, with a lancet, through the integuments of the eyelid externally, parallel with the fibres of the orbicularis muscle. The point of the instrument should be directed towards the groove of the gland.

Œdema.

Make several slight punctures with the point of a lancet into the integuments covering the part. M. Dance recommends simple incisions, half an inch or an inch long, excessively superficial, and only involving the epidermis.

Emphysema.

Make several incisions or punctures with a scalpel or lancet into the cellular membrane of the inflated part.

Warts.

Make, with a fine-pointed scalpel, a circular incision through the integuments round the base of the wart; then separate it from the contiguous parts. Pencil the raw surface with lunar caustic; this will stop the hæmorrhage.

Periostitis of the Head.

Make a free incision with a scalpel through the integuments and pericranium, down to the bone, and continue it through those parts that are most tender to the touch.

Whitlow.

Make a free incision of the inflamed parts with a scalpel, cutting completely through them down to the bone, in the direction of the finger, before suppuration has taken place, or as soon after as possible.

Boils

Are cut short in their progress by free incisions through them, from the apex to the base, with a lancet or fine bistoury.

Carbuncle.

Make an early and free crucial incision with a scalpel into the tumour, without penetrating into the sound parts. If the carbuncle be small, one straight incision through its centre will suffice.

Phlegmonous Erysipelas

Is arrested to a certain extent by making incisions of various lengths, according to the age and strength of the patient, through the middle of the inflamed skin and the subjacent adipose and cellular textures of the part, in a direction parallel to the long axis of the limb.

Incised Wounds.

If an incised wound do not extend very deep, the edges are to be accurately brought together by adhesive plaster; if very deep, the interrupted or twisted suture must be used, and retained in its proper place by a bandage. If an artery has been wounded, it must be tied both above and below the orifice. Mr. Guthrie states that the lower end of a divided artery is more prone to secondary hæmorrhage than the upper.

The diseased part is always to be examined in a strong light, and as far as possible isolated and easy of access, which, by a suitable position, may in most cases be contrived.

This is a necessary step to guard against unintentional injury, slowness, and all the little vexations which result from the surgeon being inconvenienced in his movements. The operator is to stand at the side of the wound, his own position and that of the assistants, as well as of the patient, should be so comfortable, that they may be kept without fatigue during the whole continuance of the dressing. Unless in cases where it is necessary to make pressure, as when hæmorrhage is dreaded, all parts of the apparatus should be lightly applied, and this is particularly obligatory on a first application, owing to the inflammatory swelling which must ensue, and, in general, where it is much to be apprehended.

Care should be taken not to leave the wound too long exposed to the air, which dries and irritates its surface, and likewise to cleanse it of the blood which covers it, particularly when it is subsequent to the first dressing, and owing either to some little rudeness done to a part, or to any other cause, experience having proved that this fluid gives to wounds an unhealthy aspect, and impedes their cicatrisation when they are suppurating. Lastly, we must always be careful to keep the wound and the dressings strictly clean; and also the bed, which must be protected by guards. As soon as the dressing is finished, we are carefully to place the patient and the wounded part in as convenient a position as possible, and protect the latter from all pressure which creates uneasiness.

Punctured Wounds

Ought to be dressed superficially with unirritating substances, and strict antiphlogistic measures enforced, especially bleeding, local and general, — particularly so if any important part be involved: hæmorrhage may be sometimes suppressed by wet compresses and bandages; but, should these means fail, the wound must be dilated, and the artery secured.

Wounds of the fixed viscera, though highly dangerous, are not necessarily mortal. The simple principle of avoiding or subduing inflammation, must guide us in the attempts at relief in these cases.

Punctured Wounds received in dissecting.

The hand or finger should immediately be washed, and the wound sucked for at least fifteen or twenty minutes, without intermission, and covered with court plaster.

Poisoned Wounds.

Dr. Barry observes, — In all cases of superficial poisoning, when the deleterious matter is simply deposited in the wound, the application of the cupping-glass over the point of contact will save the individual, provided it be made with the precautions to be noticed hereafter, and before a dose sufficient to cause death shall have been absorbed. — In cases where the poison has been injected, as, for instance, by the hollow fang of a viper or rattlesnake, though the cupping-glass may have been applied, yet, as the local action of the venom goes on in vacuo, the parts acted upon should be cut out after the venom has been concentrated and partly extracted by the cupping-glass, which should be immediately re-applied over the wound made by the knife, for the purpose of extracting the contents of the newly divided vessels from a greater distance than could be done before the operation. After this, the actual cautery may be administered if necessary; but never, under any circumstance, before the second application of the cupping-glass, for this reason — that when the mouths of the vessels are hermetically sealed by the hot iron, they can give out nothing to the vacuum.

The poisoning that results from the bite of a mad dog, so far as regards the simple deposition of the deleterious matter in the wound and the total absence of local action upon the wounded tissue, comes strictly under the first or least complicated class of cases. But the tardiness with which the poison is absorbed, or, if absorbed, with which it produces its peculiar effects, entitles it to be considered as a species sui generis.

Fortunately this anomaly does not alter the preventive indications. These are purely physical, and, as such, must be ever unvaried. The first thing, then, to be done in treating the recent bite of a rabid dog, is to apply a powerful cupping-glass over the wound. This measure supersedes at once the ligature, ablution, excision, &c., during the period of its application, and for a certain time after its removal. After the cupping-glass has been applied for an hour at least, the whole of the parts wounded or abraded by the bite should be freely dissected out. The cupping-glass should then be reapplied immediately, for the reasons already stated. The wound should next be hermetically sealed by the actual cautery.

The part should be as little exposed to the contact of the air as possible after the slough comes away, and healed up immediately.

Lacerated Wounds.

After the removal of extraneous matter and the suppression of hæmorrhage, if any exist, lacerated wounds, when simple, ought to be treated as incised wounds; but in complicated lacerations, where the fascia and tendons are mutilated, and are lying detached in the wound without the least prospect of reunion, such portions must be cut off with a very sharp fine-bladed knife, and the edges of the wound brought lightly in contact by means of adhesive straps, and retained by the many-tailed bandage. When a wound with an extensive loss of substance has been inflicted, arteries of some size are for the most part divided: the first duty of the surgeon is to include them in ligatures. If much swelling and pain follow the approximation of the lips of the wound, the straps and bandage must be removed, and the whole surface covered with a warm poultice, which should be repeated frequently until suppuration is fully established, when the edges may again be drawn together. After the sloughs have separated, the surface of the wound becomes clean and granulating; simple dressings may be then employed.

Bite of a Rabid Animal.

As soon as possible after the accident, two free incisions are to be made, meeting like two segments of a circle, thus , sufficiently large to include a portion of flesh greater than the depth to which the teeth of the rabid animal have penetrated. Every puncture must be treated in a similar way. If the fingers or toes be mutilated, or if the teeth have perforated between the bones of the hand or foot, it will be necessary to amputate the parts. If the parts have been freely excised, the edges of the wound are to be brought together, and kept so with adhesive plaster. This treatment is applicable to the bites of venomous serpents.

GUNSHOT WOUNDS.

Here the name sufficiently indicates the cause of the injury. When a ball has struck a fleshy part without injuring any material blood-vessel, we see a hole proportioned to the size of the ball, but smaller than it, with a lip discoloured and forced inwards; and, if it has passed quite through, the orifice on the other side is larger and more ragged. The appearances vary materially, according to the nature of the part wounded and the degree of force with which it has been struck, and this variableness renders it difficult to lay down specific symptoms.

Treatment. — The removal of extraneous bodies from the wound is the first point to attend to. If you discover the situation of the ball, either by the finger or the probe, you may attempt to extract it with the forceps; but if these fail, it will be necessary to dilate the wound: in many cases, indeed, dilatation cannot be dispensed with, and should be set about immediately; — these are, when extraneous matter cannot be conveniently expelled — where an artery has to be secured, or where a fracture has taken place: in this latter case, we want to remove detached pieces of bone, or to replace a protruding part. But where the injury is extensive, you must defer the dilatation until the inflammation has lessened or subsided; lest, by adding an incised wound to the already contused one, you increase the sources of irritation. In the next place, you must apply yourself to the prevention of inflammation, and the hastening of the suppurating process.

WOUNDS OF THE THROAT.

The first thing to be attended to in a cut throat case is to secure the bleeding vessels as soon as possible, either by means of the tenaculum or forceps: this being accomplished, the next step is to wash the wound with lukewarm water and a sponge, so as to remove coagula; in performing this, great care must be taken not to allow any blood or water to enter the trachea. As soon as the oozing of blood ceases, the edges of the wound are to be brought in contact, and retained by means of the interrupted suture. The needle is passed through the integuments and muscles down to the cartilages, but not through them. All the sutures being passed, they are to be tied, and adhesive plaster put on the wound between each ligature, and over this a portion of lint and a roller.

The head must be firmly fixed on the breast by means of the common roller, so as to make the edges of the wound approach each other.

After the operation, an elastic gum catheter should be passed from one of the nostrils down the pharynx and œsophagus (if the latter be wounded), by which means the requisite food and medicines may be injected into the stomach without the risk of their passing through the incision.

RADICAL CURE FOR THE GROWING IN OF THE NAILS.

Having cleaned the root of the nail, and marked the distances with a very small fine knife, make gentle, repeated, and cautious incisions until the nail is cut through, and the epidermis reflected below it exposed. The occasional use of a small lever at this stage of the operation is necessary to show how far we have penetrated. The nail is to be gently loosened from its attachments by means of a small pair of forceps, which has a rounded point, and provided with a sliding clasp.

Another Method.

Push quickly up the middle of the nail, at its under surface, the blade of a stout and sharp pair of scissors as far as its root, and cut the ungus into two parts. The anterior point of each portion of nail is then taken by a pair of pincers and turned back on itself, and separated from its root with a scalpel.

PERSONS APPARENTLY DROWNED.

As soon as the body of a person recently drowned is taken out of the water, it must be carefully conveyed, with the head raised, to a house or other place where it can be laid dry and warm. The clothes must be immediately stripped off, and the body wrapped up in blankets well warmed. It should be laid on its back, with the head a little raised. If the weather be cold, it should be placed near a fire, and a heated warming-pan should be passed over the body; bottles filled with hot water and covered with flannel should be applied to the axilla, inguinal, and popliteal regions; but in warm weather it will be sufficient to place it between two blankets well heated, or in the sunshine, taking care to prevent the room being crowded with persons who are not necessarily employed in the operation. At the same time the whole body should be rubbed with the hand, or with hot woollen cloths. The rubbing should be moderate, but continued with industry, and particularly about the breast.

Apply bottles of hot water or heated bricks to the feet, palms of the hands, belly, and chest; or the hot air bath to the whole surface of the body.

Hot Air Bath.—The patient having been laid on a warm blanket, the apparatus is to be placed over him, and covered with one or two blankets, which are to be tucked under his chin. At the opposite and closed end of the frame is attached a tin tube communicating with the interior of the frame; and, at the lower end of the tube is to be placed a spirit lamp lighted. As the tube is very apt to get hot, you must take care that the blankets do not touch it, or they will be burned. If the heat become uncomfortable to the feelings of the patient, you may remove the spirit lamp for a short time, and then apply it again.

The frame consists of a basket work of an arched shape, open at one end, and about six feet in length.

The lungs are to be inflated according to the directions given for that purpose.

When signs of returning life are apparent, the friction must still be carried on, but more gently. These methods must be continued four or five hours, as in several instances they have proved successful, although no symptoms of reanimation appeared until that time. Dr. Curry advises the operation to be repeated in a regular and steady manner for six hours at least. When the patient is able to swallow, he must take some wine, brandy, or aromatic spirit of ammonia in warm water. Introduce some moderately warm and stimulating liquor into the stomach by means of a syringe and flexible tube, such as half a pint of warm negus, or water with spirits of hartshorn, mustard, or essence of peppermint. Till the power of swallowing is pretty well restored, it will be dangerous to attempt getting spirits down the throat in any other way. The best time to administer a stimulating cordial of the above kind, is a few minutes after the other part of the process is begun. A clyster of a pint or more of water, moderately warmed, with the addition of the materials before mentioned, or of rum, brandy, or gin, may be administered. Where stupor, headach, &c. remain after the person has come to himself, it will be advisable to draw off a small quantity of blood — and possibly the best way of doing it will be by cupping, or the application of leeches to the temples or nape of the neck; but where these symptoms do not prevail, or before the natural heat is restored to the body, bleeding in any manner will be more likely to do harm than good. The quantity of blood extracted from the neck or arm in suspended animation should not exceed from one to four ounces.

The means above recommended are likewise applicable in the case of suspension by the cord.

But in the circumstance of strangulation, a few ounces of blood must be taken from the jugular vein or arm.

In cases of suspension by the cord, the quantity of blood to be abstracted must be enough to unload and relieve the vessels of the head, without weakening the powers of life.

M. Aldini recommends the employment of galvanism in suspended animation. He immerses the hand in a solution of muriate of soda, and establishes an arc, one of the extremities of which is made to pass round the fore-arm, while the other is brought in contact with the bottom of the pile. He adapts to the extremity of another arc an elastic probe, which is applied to one of the ears, moistened, by means of a syringe, with the same solution, and connects the other extremity of the arc with the summit of the pile.

DISLOCATIONS IN GENERAL.

A bone is said to be dislocated, when its articular extremity is displaced from the surface of the bone which received it, or on which it had motion. The dislocation is called complete, when the articular surface of the dislodged bone is driven into some other part.

Complete dislocations take place most frequently in ball and socket joints, as in them the capsular ligament is thinner and more loose in all directions, so that it cannot resist the force that displaces the bone.

Incomplete, when part of it remains in contact with a portion of the articular surface of the other bone, but with which it does not correspond, and on which it cannot possess its natural motions.

Joints of more limited motion, as the ankle, elbow, and knee, are more liable to incomplete than complete dislocation.

Dislocations, taken in a general point of view, differ from one another with respect to the articulation in which they take place, the extent of the dislocation, the direction in which the bone is displaced, the length of time they have continued, the circumstances which accompany them, and which mark them out as simple or compound, and the cause that has produced them.

A joint is known to be dislocated by pain, greater or less in proportion to the injury done to the soft and sensible parts, and from the pressure of the head of the bone upon them after the dislocation has taken place. By the loss of motion which always takes place in some degree. Sometimes the limb is rendered absolutely stiff and immoveable, with most acute pain on the smallest attempt at motion; in other cases, the limb may be moved in some degree without any great increase of pain. These different circumstances are owing to the nature of the surrounding parts and the position which the bone assumes after its dislocation. And, lastly, an alteration in the shape of the joint: this is evident both to the eye and likewise to the touch.

In most cases, part of the dislocated bone will be felt forming a prominence in a new situation, while a vacancy will be perceived in the part from whence it was driven.

It is a matter of great importance to distinguish with accuracy a fracture from dislocation; for sometimes, when a fracture happens to be very near a joint, it is apt to be mistaken for a dislocation. This, however, may always be done by making the head of the bone roll, which is done by rolling the limb to which it belongs. If the bone is broken, a grating occasioned by the friction of the broken ends of the bone upon each other will be distinctly perceived, but not in a dislocation.

Dislocations very seldom occur in children, as in them the force applied rather tends to produce a fracture of the bone, or a separation of the epiphysis.

DISSECTION OF PARTS RECENTLY LUXATED:— Besides laceration of the capsule and ligaments, most recent luxations are accompanied by an effusion of a greater or less quantity of blood in the neighbourhood of the joint, by rupture or extension of tendons and muscular fibres, and by injury of nerves. However, the inflammation that follows seldom terminates in suppuration, but slowly subsides, the effused blood is absorbed, and the functions of the injured parts are afterwards in a measure restored.

In the mean time, the head of the displaced bone accommodates itself to its new situation, and forms a cap in the cellular membrane, muscle, or bone, against which it rests, whilst adventitious ligaments are created from the surrounding cellular tissue, and either unite with the remains of the torn capsule, or become fixed to the bone, and secure it firmly in its place. After a time some motion is acquired, and the use of the limb may be partially restored.

Treatment.—Consists in replacing the protruded bone, and retaining it in its natural situation by proper bandages, until the surrounding parts have recovered their tone.

In order to render the reduction easy, the whole of the muscles surrounding a joint are to be relaxed as much as possible; the dislocated ends of bones are to be immediately disengaged from the contiguous bones, or from any unnatural cavity in which they may be lodged. To do this, moderate extension and counter-extension are necessary. For the purpose of applying extension and counter-extension for the reduction of dislocated bones, a variety of machines have been contrived, but the only means to be depended on are the hands of intelligent assistants and compound pulleys. In most cases, the force should be made to act as directly as possible upon the affected joint. Should considerable extension be necessary, it ought always to be done gradually, and in such a manner as not to make the head of the bone catch either against the edge of the socket or against any of the contiguous parts of the bones towards which it may be forced.

The degree of force to be employed can only be estimated by the difficulty of the reduction: it should always be sufficient to accomplish that end; although it is to be constantly recollected that force alone is never to be relied on, but skill in the direction of it is ever to be exerted.

If much pain, swelling, and inflammation should arise after the reduction, topical venesection and the other parts of the antiphlogistic course are to be employed.

REDUCTION OF OLD DISLOCATIONS.

In attempting these reductions, we must be guided by the nature of the joint (ginglymoid joints sooner become anchylosed after dislocation than the orbicular); also by the condition of the joint.

Mr. B. Bell does not consider a dislocation old until the sixth month; he has reduced them at four months. Desault never attempted them after the third month. Sir A. Cooper limits us to three months for the shoulder, and two for the hip. M. Marx has succeeded at the 98th day for the shoulder, and 78th for the hip. Dr. Smith, of America, ten months. M. Sedillot reduced the humerus one year and fifteen days after the accident. C. M'Kenzie, between five and six months.

If it is easily moveable, it is favourable; it is also favourable when the head of the bone dislocated is thrown among soft parts, as the connections formed are cellular, and may be overcome.

When the dislocation is of long standing, before it can be reduced, the new adhesions are to be torn up, and violence must be done to the limb, as great, perhaps, as that which caused the first displacement of the bone; while, in recent dislocation, there is no obstruction to the reduction but in the muscles or natural ligaments.

Incomplete dislocations are unfavourable, from the end of the bone resting on the edge of the old socket, there exciting irritation, causing a new socket to be formed and the old one to be destroyed, so that there is no cavity to receive the bone in when reduced.

In dislocations of the shoulder into the axilla, when the artery has followed the bone and can be traced adherent to it, attempts at reduction may cause its rupture or the formation of an aneurism.

Dr. Gibson reduced a dislocated os humeri eight weeks after the accident, by the employment of the usual means, which occupied about 30 minutes. The patient died the same day. Upon removing the coagula from the axilla, the axillary artery was found ruptured, owing to an adhesion which had formed between it and the capsule, thereby rendering this event inevitable, but impossible to have been foreseen.

Treatment. — Position must vary with the different dislocations; but, as a general rule, the sitting posture is preferred for the upper extremities, and the recumbent for the lower. The patient should not lie on the floor, as it will be found inconvenient to the surgeon. The chair or table should be immoveably nailed to the ground, and the patient's body should be firmly fixed on it. The counter-extending force must be so applied as to prevent the muscles, which are to undergo extension, being compressed. The table being thus fixed in the centre of the room, round part of which the segment of a circular rod of iron is passed in the same plane with the table; care must be taken that the centre of it be the centre of the circle of which the rod is a segment. To prevent the rod from yielding to the extending power, it must be attached to the wall by short rods, so curved that the point of attachment be on its outside.

The hook of the pulley will thus pass without interruption along the rod. By this simple contrivance the direction of the limb may be changed, while the body remains fixed without relaxing the extending power.

COMPOUND DISLOCATIONS.

Compound dislocations are those which are accompanied with a laceration of the integuments and muscles covering the joints.

Sometimes the opening in the integument is caused by the protrusion of the bone, or by the part having struck against a hard or an irregular body.

Treatment.—When the extremity of the bone protrudes, and is smeared with sand or dirt, as frequently happens from its having touched the ground, it should be washed with warm water, as the least extraneous matter admitted into the joint will produce and support a suppurative process; and the utmost care should be taken to remove every portion of it adhering to the end of the bone. If the bone be shattered, the finger is to be passed into the joint, and the detached pieces are to be removed; but this is to be done in the most gentle manner possible, so as not to occasion unnecessary irritation; and if the wound be so small as to admit the finger with difficulty, and small loose pieces of bone even be felt, the integuments should be divided with a scalpel to allow of such portions being removed without violence. — The limb is to be placed in splints, with the necessary pads, eighteen-tailed bandage, &c.

Partial Dislocation of the Lower Jaw.

The condyloid process on only one side is displaced; the mouth opened, but not so much as in the complete dislocations; the chin is directed to the side opposite the injury.

Treatment. — The jaw may be reduced by means of the cork or lever of wood.

Le Cat succeeded in reducing an obstinate dislocation of the jaw, by introducing a stick between the back teeth, and using it as a lever, continually prizing the teeth of the upper and lower jaw apart, until the muscles which were spasmodically contracted became fatigued, and then the reduction was easily effected. Wine bottle corks are generally used for the purpose; they should be placed on each side of the mouth behind the molares teeth, after which the chin is to be raised.

Subluxation.

The condyloid process of the jaw is sometimes displaced from the interarticular cartilage of the joint slipping before its edge, fixing the jaw with the mouth slightly open.

Treatment. — It is necessary to apply some degree of force downwards and backwards to separate the condyloid process from the temporal bone, and thus allow the cartilage to resume its proper situation.

Complete Dislocation.

The mouth is more or less open. It is more so in recent dislocations, than in those that have continued for some time. An empty space is felt before the ear, where the condyles were placed. The coronoid process forms under the cheek-bone an eminence which is felt through the cheek, or by introducing the finger into the mouth.

The cheeks and temples are flattened by the lengthening of the temporal, masseter, and buccinator muscles; the saliva flows in large quantities from the mouth, irritated by constant exposure to the air, which increases its secretions. The compression made on the salivary glands, and the irritation and friction they experience, contribute to render the secretion of the saliva still more abundant.

The arch formed by the teeth of the lower jaw is placed anterior to that formed by those of the upper, and the direction of their edges shows that this disposition is unnatural. The patient can neither speak nor swallow during the first days of the dislocation.

Treatment. — The patient should be placed on a low seat, with an assistant behind to support his head: the surgeon stands before him, and placing his thumbs deep in the mouth, rests them upon the posterior molares teeth; the fingers grasp the chin and base of the jaw. Pressure is then made downwards by the thumbs to disengage the condyles from the roots of the zygomatic process; at the same time the chin is elevated by the fingers, and the condyles are suddenly dragged into their places by the spasmodic action of the muscles. At this moment it behoves the operator to be careful in removing his thumbs from between the teeth, for the condyles regain their situation very suddenly, and the jaws are spasmodically closed with great force. To prevent their being bruised, he slips them very quickly outwards between the cheeks and teeth, where they are safe.

If the jaw cannot be reduced in this way, an attempt should next be made to replace first one condyle and then the other.

Dislocation of the Horn of the Os Hyoides.

It is attended with a sudden difficulty of swallowing, with an uneasy sensation, which excites increased action in the muscles of deglutition. There is a painful prominence of the bone, feeling like a tumour on the throat.

Treatment.—The manner of replacing it is by pressing and moulding the parts on the outside of the throat with the fingers of one hand, while the forefinger of the other hand is put into the mouth, and as far as possible over the root of the tongue, so that the tongue and, consequently, the body of the os hyoides may be pressed forward.

DISLOCATION OF THE HEAD FROM THE ATLAS, FROM A DISEASED STATE OF THE LIGAMENTS.

Pain in the neck, becoming more severe at night, or in swallowing a large mouthful, or drawing a deep breath, is the first symptom. Pain on one side of the neck, especially when the head is moved towards the shoulder; it extends from the larynx towards the nape, and often to the scapula of the pained side: pressure on the region of the first and second vertebræ produces considerable pain, and thus points out the seat of the disease. The head sinks towards one shoulder, the face being turned a little down. If both sides are affected, the head will incline directly forwards. The patient feels as if the head were too heavy, and he moves from the sitting to the lying position, or vice versâ. A peculiar expression of pain in the countenance.

If the upper vertebræ be injured, sensation is lost in the upper extremities; if the dorsal vertebræ or upper lumbar, the lower extremities are completely paralysed, and perfectly insensible to the most powerful stimulus, while the heat and circulation in the limbs are but slightly if at all diminished; and if the lumbar be injured, the fæces pass involuntarily, and the urine is retained.

Treatment. — Local blood-letting by leeches, cupping, and the application of blisters, setons, and issues.

First Cervical from the Second.

When the rotatory motion of the head is forced beyond its proper limits, the ligaments which tie the processus dentatus to the edge of the foramen magnum are torn; and supposing the head to be forced from the left to the right, the left side of the vertebra is carried before its corresponding articulating surface, while the right side falls behind its corresponding surface. Sometimes the toothlike process, the ligaments of which are broken, leaves the ring formed for it by the transverse ligament and the anterior arch of the first vertebra, and presses on the spinal marrow.

The odontoid process forms a species of pivot around which the atlas turns, attached to the inner side of the condyles of the os occipitis by two short fibrous bundles: it cannot press upon the marrow without previously rupturing the transverse ligament of the first vertebra, unless it should slip from under it, in which case the odontoidal ligaments must necessarily be previously lacerated. In order to produce this effect in either of these ways, considerable force is required. In children, slighter efforts will produce the same effect. In them, the vertical process of the second vertebra is but slightly developed, its ligaments are much less unyielding, the ring which encloses it is less close; the transverse ligament also possesses a certain degree of elasticity; so that this process might escape from beneath the latter band without lacerating its proper ligaments.

These are the different peculiarities of these parts in youth which enable us to comprehend how, by raising a child from the ground by means of the hands placed on each side of the head, we might cause his immediate death if he should make any struggles to disengage himself from our grasp.

THE SYMPTOMS produced by pressure on the spinal marrow, are a loss of sensibility and of motion in the parts supplied from that portion of the medulla spinalis below the accident.

The two first cervical vertebræ are so articulated, so connected with each other and with the head, that an instrument or weapon might easily be thrust into the spinal canal without dividing any but soft parts, and occasion instant death by the injury inflicted upon the superior part of the spinal marrow.

Mr. Louis, in making researches on the manner of dying of hanged persons, found that those despatched by the executioner of Lyons perished by the luxation of the first vertebra from the second, whilst those hanged at Paris were suffocated by strangulation.

He discovered the cause of this difference in a rotatory motion given to the body of the culprit by the executioner at Lyons at the moment that the ladder was taken from under his feet.

Treatment.—If the luxation produce no symptom which indicates a compression of the spinal marrow, it is prudent to abstain from all attempts to reduce it. However, if the patient absolutely insist on our interfering, we are to proceed in this way:—We are to incline the head to the side towards which it is directed, in order to disengage the articulating process of the upper vertebra. This part of the operation is extremely dangerous, as it may kill the patient by causing a compression on the spinal marrow. When the process is disengaged, the head and neck are brought to their right direction by making them perform a rotatory motion, the contrary of that which had taken place in the dislocation. The head is kept free from motion by means of bandages, which are attached to the head and shoulders.

Complete Dislocation of the Fourth Cervical Vertebra without Fracture.

Symptoms.—Complete loss of sensation and voluntary motion in every part below the neck. Respiration performed solely by the diaphragm; pulse weak and slow; surface of the body quite cold; constant priapism.

Dissection.—A complete dislocation of the fourth cervical vertebra from the fifth was found: its inferior oblique articulating surfaces had passed completely in front of the superior articulating surfaces of the fifth cervical vertebra; its body, separated from the intervertebral substance, stood over that of the fifth by its whole depth. No fracture could be discovered.

The patient, a stout young man, 22 years of age, lived four days after the accident.

DISLOCATIONS OF THE CLAVICLE.

It may be dislocated at its sternal extremity, forwards, backwards, and upwards. If the luxation be forwards, a hard circumscribed tumour is felt or even seen on the anterior and superior part of the sternum, which is made to disappear by carrying the shoulder forwards and outwards; and an empty space is found where the head of the clavicle should be placed. — In dislocation upwards, the space between the sternal ends of the clavicles is diminished.

Treatment.—The shoulders are to be drawn backwards, by which the clavicle is drawn off the sternum, when it falls into its natural situation. The shoulders must be kept in this position by means of the clavicle bandage and pads, and the arm must be supported in a sling.

DISLOCATION OF THE CLAVICLE REDUCED AT THE EXPIRATION OF TWELVE WEEKS, BY MR. LYFORD. — On the superior part of the sternum was a distinct obtuse projection, exquisitely sensible when touched, and attended with slight inflammation of the integuments: this projection could readily be traced as a continuation and termination of the clavicle, though the motions of the shoulder appeared to produce no alteration in its situation. The motions in question were painful; the shoulder itself had a decided inclination forwards, and the distance between its point and the mesial line of the sternum was shorter on admeasurement than in the opposite extremity.

Treatment — Consisted in the application of the clavicle bandage with pads under the axilla. The shoulders were drawn backwards as far as they could be, until the scapulæ were approximated. The patient was confined in bed for three weeks on his back, which greatly assisted the bandage in its office of retaining the shoulders in the wished-for position. Moderate pressure was made by the application of soap-plaster on the dislocated parts.

Scapular Extremity.

If there be pain on the top of the shoulder, succeeding to a fall on the part, and if, on examination, the extremity of the clavicle be found projecting under the skin covering the acromion, we may be sure it has taken place. The patient inclines his head to the affected side, and moves as little as possible either the arm or shoulder; because he cannot move these parts without calling into action the deltoid or some other muscle, which would, consequently, extend the motion to the diseased part, and cause pain.

Treatment.—The dislocation is reduced by carrying the shoulder outwards: this is easily accomplished by the surgeon fixing his knee between the scapulæ, and at the same time forcibly drawing the shoulders backwards from each other. After the reduction, a pad should be placed in each axilla, for the purpose of elevating the scapulæ, keeping them from the side of the thorax, and to defend the soft parts from the bandage, which should next be applied.

DISLOCATION OF THE RIBS.

Sometimes the sternal extremities of the sixth, seventh, eighth, and ninth ribs are separated from their cartilaginous appendages, and become protuberant. Where the vertebral end of the rib has been separated from the vertebra, we find an evident hollow. The other symptoms are nearly similar to those produced by fracture, with the exception of the crepitus.

Treatment. — In dislocation of the vertebral ends of the ribs, we make the patient draw a full inspiration, and with the fingers knead the projecting cartilage into its place. Apply compresses and bandages, and bleed if necessary.

J. Herving, 46 years old, was squeezed into a space of five inches, and was so wedged as to stop the horse then at work at the mill. When brought into the hospital (Middlesex), he was pale and breathless, and a cold sweat bedewed his face and body: his chest was to the feeling like a dead body, where the thorax had been opened, and the sternum left loose under the integuments; for, on both sides, the end of each rib, at its junction with the cartilages, stood out distinctly marked and prominent. Sir C. Bell states: — There are, in a case of this kind, no means of reducing the dislocation of the cartilage but by causing the patient to inspire forcibly; and no means of relief but by bleeding, and by the application of a roller round the chest. This patient entered the hospital on the 5th of September, and left quite well on the 30th of the same month.

DISLOCATION OF THE OS HUMERI.

The humerus can be luxated in four directions; —

First—*Downwards and inwards into the axilla.*

Second—*Forwards under the pectoral muscle below the clavicle.*

Third—*Backwards on the dorsum of the scapula, below the spine.*

Fourth—*Head of the bone rests against the external side of the coracoid process of the scapula.*

In the Axilla.

The affected arm is longer than the other.—The arm loses its vertical position, and inclines obliquely downwards and outwards, and the elbow is very much separated from the body if the dislocation be recent.—When in the healthy state, if the fingers be moved along the external part of the os humeri, an equal resistance is felt along its whole length; but in a case of dislocation, it is only at the middle part that this resistance is felt: on the upper part, the integuments, no longer supported by the superior extremity of the bone, yield to the pressure of the fingers. The acromion projects; an empty space is felt under it, in which the head of the humerus should be placed; the summit of the shoulder has lost its roundness, and a hard tumour formed by the head of the humerus is found in the axilla. The motions of the joint are in a great degree destroyed, especially upwards and outwards, and the patient cannot raise his arm by muscular effort.

Dissection of a Recent Dislocation of the Head of the Humerus.—The patient was seized with apoplexy, and in falling to the ground dislocated the head of the humerus: he died shortly after the accident.—The capsule was torn at its inferior part very near its insertion into the neck of the humerus. The head passed freely out, and could be readily returned within it. The greater tuberosity was fractured, and detached from the rest of the bone.

Subluxation at the shoulder joint sometimes occurs in children of a very debilitated frame of body, from so slight an effort as the suddenly raising the arm.

Treatment.—If the surgeon be called soon after the accident has happened, he is to press firmly with one hand against the acromion; and with his other, grasping the arm above the elbow, forcibly to extend it, the patient being seated. In a great number of instances, this simple manœuvre has succeeded instantly in reducing the bone.

Sue recommends the extension to be made upwards and a little forwards, in the direction of a line passing between the tendons of the subscapularis and teres minor. The arm, therefore, must be elevated and sustained by the surgeon, who pulls upwards; while an assistant supports the inferior angle of the scapula with one hand, and with the other depresses the acromion.

The surgeon also, having made the necessary extension, may assist the reduction by pressing the fingers of the other hand on the humerus in the arm pit, while he suddenly depresses the arm.

When a greater force is necessary, the patient must be placed on a sofa or table, near the edge, in a recumbent posture; and a wetted roller should be bound round the arm immediately above the elbow, upon which a handkerchief is to be tied.

The surgeon places the heel of one foot in the axilla, and rests the other upon the ground, as he sits by the patient's side. The arm is then steadily drawn with the handkerchief for three or four minutes; at the end of which, the bone, in common cases, is easily replaced. The force of two or more persons may be employed in extending by means of the towel, if required. Should this process be found insufficient, owing to the resistance of the muscles, the forces may be increased by folding a sheet diagonally, placing the centre of it in the axilla, carrying the ends over the opposite shoulder, and securing them to a staple or post — taking care previously to fill the axilla with a ball of linen or some similar substance to take off pressure from the edges of the pectoralis major and latissimus dorsi muscles. Another sheet or towel, folded in a similar way, must next be secured to the wrist or above the elbow by a wet roller, and its ends given to two or three stout assistants. The scapula is to be fixed by a third sheet, the middle of which is placed upon the acromion process, and there held by another assistant, while the ends are carried across the chest and firmly secured at the opposite side. The person holding the scapula bandage should keep it fixed, whilst the others draw from the bandage affixed to the arm with a steady, equal, and combined force.

Should these means also fail, recourse may be had to the pulleys. — Place the patient on a low seat, in an upright position, and proceed in the following way: — Pass the middle of a broad sheet around the chest, and fasten its ends securely at some distance from the patient, and opposite the injured shoulder. Then roll the arm, just above the elbow, in soft buckskin; over this place the middle of a napkin, and bind it by a roller to the arm. Next tie the ends of the napkin together, and hook them upon a pulley fastened to the floor. Lastly, secure the scapula, by passing the centre of a towel, or leathern strap hollowed out for the purpose, over the acromion process, and give the ends in charge to one or more assistants seated upon the floor next to the sound side of the patient. Every thing being ready, the surgeon takes hold of the patient's forearm, and bending it across the chest, uses it as a lever, and communicates a rotatory motion to the arm, while an assistant is directed to keep up a very slow and gradual extension by tightening the cord of the pulley.

This plan seldom fails, provided the force employed is continued a sufficient time, and without violence; especially when conjoined with blood-letting, nauseating antimonials, &c. &c.

Dr. Belville adopted the following novel method of reducing a dislocated arm for a man who was drunk and refractory. — The patient was placed upon the sound side on the floor; and, to effect counter-extension and the confinement of the patient at the same time, he passed a folded sheet beneath the dislocated shoulder, and directed an assistant to stand on it on each side of the patient, so as to confine him to the floor. The surgeon then, grasping the wrist, made extension upwards, which can be done in that position with peculiar advantage, since we can lift with more power than we can pull horizontally. Counter-extension being made upon the scapula by the hand of an assistant, and the usual flexions impressed upon the bone, it was without difficulty reduced.

Forwards.

The arm preserves nearly its natural length, unless the head of the bone be brought secondarily towards the clavicle, in which case it is shortened. The elbow is placed outwards from the body, and carried backwards: a bony eminence is felt at the superior and external part of the breast, before the point of the shoulder, and below the clavicle: there is no tumour in the axilla: the point of the shoulder is more round, and the acromion is less prominent, than in dislocations downwards: lastly, the motion of circumduction is impossible.

A singular case of dislocation of the os humeri is related by Baron Larrey, who saw the preparation of it in the cabinet of the University of Vienna. In this instance, the head of the os humeri, owing to a violent fall on the elbow, was displaced from its proper situation, forced into the hollow of the axilla under the pectoral muscles, and passed into the cavity of the chest between the second and third true ribs, pushing before it the pleura costalis. This patient lived fifteen years after the occurrence of the accident, and then died of a disease entirely unconnected with the luxation.

Upon dissection after death, the head of the bone was found situated as described, surrounded by the pleura, and its neck firmly embraced by the two ribs. Its cartilage and osseous texture had entirely disappeared; and it was converted into a soft membranous ball, which could be readily compressed by the fingers.

Treatment.—The scapula must be fixed, and the bandage and leather, &c. above the elbow applied as directed for dislocation in the axilla.

The biceps muscle must be relaxed; and the extension must be made outwards, a little downwards, and backwards: if the extension be made horizontally in this case, the coracoid process of the scapula will prevent the head of the humerus from passing outwards into its proper situation.

The stiffness of a joint which follows a dislocation of the os humeri is generally of short continuance, and its motions are soon perfectly restored. The arm should be gently moved after a few days have elapsed, and these motions are to be gradually increased.

Dislocation backwards on the Dorsum of the Scapula.

In this dislocation, the head of the humerus is thrown upon the dorsum of the scapula below the spine, where it forms a projection at once perceptible to the eyes of the surgeon; and this enlargement may be seen, and felt to move, when the elbow is rotated; projection of the coracoid and acromion processes, as well as of the external part of the clavicle, visible depression, and evident hollow beneath these points.

The motions of the arm are less confined than in either of the former dislocations.

Treatment. — In the dislocations backwards, in addition to the extension and counter-extension, some pressure should be made upon the head of the bone, and an attempt to push it towards its socket whilst the extension is made.

A dislocation of the humerus backwards into the fossa infraspinata was reduced, a year and fifteen days after the accident, by M. Sedillot.

Immobility of the Shoulder Joint, from Displacement of the Tendon of the Biceps.

The tendon of the biceps muscle, which runs in the excavated groove at the head of the os brachii, having, by some turn of the limb, slipped out of the sulcus, and resting on one of the little exuberances of the upper part of the channel till it returned, has occasioned not only an immobility of the joint, but most violent pain.

Treatment. — The arm being bent, the muscle is relaxed; and while an assistant, holding the lower extremity of the os brachii, moves the head therefore, sometimes inwards and sometimes outwards in the glenoid cavity, the operator, with his fingers, will easily replace it.

DISLOCATIONS OF THE FORE-ARM.

Backwards.

The radius and ulna may ascend more or less behind the humerus; but the coronoid process of the ulna is always carried above the articular pulley, and is found lodged in the cavity destined to receive the olecranon. The head of the radius is placed behind and above the external condyle of the humerus. The flexion of the joint is almost destroyed, and the fore-arm and hand are fixed in a supine position. The fore-arm is in a state of semi-flexion, and every attempt to extend it occasions smart pain.

In the antero-posterior direction, the inferior extremity of the humerus presents a kind of cylinder, received into a cavity of the same form, belonging to the ulna.

The dislocation of the fore-arm forwards is impossible, on account of the extension and anterior curvature of the olecranon, which embraces the posterior part of the articular pulley of the humerus: and in order that the dislocation backwards should take place, the top of the coronoid process must be carried beyond the vertical diameter of this articular pulley; for the obliquity of these surfaces is such, that, without it, this last eminence would fall again to the bottom of the great sigmoid cavity, as soon as the power which produces the displacement ceased to act: it is also on account of the convexity of this articular pulley that the coronoid process glides into the cavity destined for the olecranon, when it is gone beyond the point spoken of. The anterior and posterior ligaments of the articulation do not so much oppose the dislocation of the fore-arm backwards, as the circumstances related, and the situation of the muscles which surround the articulation.

Treatment. — The patient being firmly seated, the surgeon places his knee on the inner side of the elbow joint, in the bend of the arm, and taking hold of the patient's wrist, bends the arm. Thus the coronoid process is removed from the posterior fossa of the humerus, and the action of the muscles, draws the bones into their proper situation. After reduction, the arm is to be put in the bent position, a bandage and cold lotions are to be applied, and the arm is to be supported in a sling.

A week after the accident, the arm should be gently and repeatedly moved, to prevent anchylosis: these motions are to be daily increased, until they are performed perfectly, and without pain.

Dislocation of the Ulna and Radius internally.

The ulna may be thrown upon the internal condyle so as to produce an apparent hollow above it, and the rotation of the head of the radius can be distinctly felt.

The internal lateral ligament, which passes from the outer condyle to the olecranon and coronoid process of the ulna, and external lateral ligament, which is fixed to the external tuberosity of the humerus, and terminates in the annular ligament of the radius, increases the strength of the elbow-joint, and renders the lateral dislocation of the fore-arm very difficult.

Treatment. — These dislocations (external and internal) are reduced by drawing the humerus and fore-arm in contrary directions, and at the same time pushing the extremity of the humerus and the two bones of the fore-arm in opposite directions. Pass a roller round the part, and put the fore-arm in a middle state, neither much bent, nor extended; and support it in a sling.

If inflammation of the parts should supervene, antiphlogistic measures must be enforced.

Dislocation of the Ulna backwards.

The prominence of the olecranon behind the joint, and the fore-arm and hand being twisted inwards, accompanied with a painful rigidity of the arm, sufficiently distinguishes the nature of the accident.

Treatment. — The arm is to be bent. A handkerchief is put round it, and firmly held by an assistant, who stands behind; then with the left hand the surgeon takes hold of the arm, and with the palm of the right hand on the olecranon, endeavours, by pushing, to restore the bone to its place. An assistant may facilitate the reduction, by taking hold and pulling by the wrist, and gently bending the arm at the same time.

Dislocation of the Radius forwards.

The fore-arm cannot be bent, and the rotation of the wrist is painful. When an attempt is made to bend the fore-arm, the motion is suddenly stopped by the striking of the radius against the humerus.

This arises from the radius having burst from the coronary ligament and capsule, and now standing prominently forwards.

Treatment.—In making the extension, the humerus should be fixed, and the hand rendered as much as possible supine, to remove the head of the radius from the upper part of the coronoid process of the ulna.

The after-treatment consists in surrounding the part with compresses wet with cold lotions, and in covering the entire limb with a roller.

Dislocation of the Head of the Radius forwards in Children.

The arm is semi-flexed; forcible flexion or extension causes great pain; the hand is nearly proned; nothing, however, can induce the child to lift the arm, or, in fact, to move it in any direction; and, in spare children, about two thirds of the head of the bone may be distinctly felt projecting in front of the external condyle of the humerus.

In infants, the annular ligament, which only belongs to the superior radio-ulnar articulation, is generally less resisting than in the adult; it is the same in the tendinous fibres of the extensors, which contribute very much to increase the strength of the articulation. Hence, the dislocation of the head of the radius on the ulna is more frequent in young subjects than at a more advanced age; but what contributes still more to increase the facility with which this kind of dislocation takes place, is the proportionably smaller extent of the articular cavity at the external surface of the radius, as well as the greater length of the annular ligament, which is, consequently, more capable of extension, and also more disposed to give way.

Treatment.—The reduction of this dislocation is exceedingly simple; for if the wrist be taken hold of and rotation performed two or three times successively, the muscles will immediately return the bone, and that with so much force, that if the fingers of the left hand be placed underneath the joint, the reduction is comparatively as sensibly communicated as that of the humerus; indeed, if the ear be close to the joint, it may be sometimes heard.

Dislocation of the Radius backwards.

The hand is found in a state of pronation, and cannot be moved out of it without great pain. The head of the radius is found projecting at the external side of the olecranon. There is a considerable depression felt at the part where the head of the bone is naturally situated.

M. Noir found the upper extremity of either radius displaced from its natural situation, and situated behind the inferior extremity of the humerus, above which it mounted an inch at the least.

Treatment.—The head of the radius is to be pushed from behind forwards, and the hand of the patient is at the same time to be brought to a state of supination. The reduction is thus effected, and an audible noise is produced by the reaction of the head of the radius into the sigmoid cavity of the ulna.

A German professor has met with two cases, and the appearances were, on an examination of the joints, as follows:—the head of the radius was found thrown a little backwards and outwards from the external condyle of the humerus, and could not be immediately detected. The peculiar form of the radial side of the fore-arm, with displacement of the ulna, chiefly indicated the nature of the mischief.

DISLOCATIONS OF THE WRIST-JOINT.

Four kinds of dislocations may take place in the articulation of the bones of the carpus with the inferior extremities of those of the fore-arm, viz. Dislocation forwards, backwards, inwards, and outwards.

Dislocation forwards.

It is rarely complete; the hand remains painfully extended, and cannot be restored to its natural direction without some difficulty. The tendons which pass over the wrist, and the annular ligament which confines them, being pushed forwards, render it difficult to discover the eminence formed by the bones of the wrist before the ends of those of the fore-arm.

Dislocation backwards.

A person falling puts out his hand to save himself, and falls upon the palm: a dislocation is produced; the radius and ulna are forced forwards upon the annular ligament, and the carpal bones are thrown backwards. A swelling is produced by the radius and ulna on the fore-part of the wrist, and a similar protuberance upon the back of the wrist by the carpus, with a depression above it, and the hand is bent back.

Dislocation inwards and outwards,

Are easily distinguished by the projection or deformity at the radial or cubital edges of the wrist, and distortion of the hand.

Treatment. — In dislocations of the bones of the wrist, gentle extension must be made, while the two surfaces of the joint are made to slide on each other in a direction contrary to what they took when the accident occurred. The danger of these dislocations depends less on the dislocation itself, than on the straining and laceration of the soft parts, which are always followed by more or less tumefaction; hence the necessity of bleeding, low diet, and giving opening and cooling medicines. The hand and wrist must be covered with cloths kept constantly wet with water or the acetate of ammonia lotion. The fore-arm and hand must be kept in splints and a sling.

DISLOCATION OF THE BONES OF THE HAND.

As the bones of the wrist are of a wedge form, and in their union constitute an arch, the central bones are, by lateral pressure on this arch, liable to be forced from their place. The os magnum has been frequently displaced and luxated backwards by too great a flexion of the bones of the first row on those of the second, and form a tumour on the superior part of the back of the hand.

Treatment.—If the wrist be extended, and pressure be made on the head of the os magnum, the reduction is easily accomplished. The extension and compression by means of splints, bandages, and soap plaster, must be persevered in for some time.

Dislocation of the Fingers.

It occurs either backwards or forwards; and the projections formed by the ends of the bones indicate the nature of the injury.

Treatment.—The finger is to be firmly grasped, and bending it we shall succeed in bringing the heads of the bones into their natural situations.

It should be then rolled with tape, and surrounded and supported with pasteboard. The fore-arm and hand must be kept in a sling.

Dislocation of the Thumb.

When violent pressure is made on the thumb from before backwards, its first phalanx slips behind the head of the first metacarpal bone, and remains extended while the second is bent, its flexor muscle being thrown into action by the irritation. The distortion of the thumb, the impossibility of bending the first phalanx, and the pain, render this dislocation sufficiently evident.

In an old dislocation of the first phalanx of the thumb, on the posterior surface of the bone of the metacarpus, the extensor tendons were found on the dorsal surface of the bone, but the tendon of the flexor proprius was situated on the internal side, and turned on the posterior part of the inferior extremity of the metacarpal bone; a circumstance which should not be forgotten in attempts at reduction of this kind of dislocation.

Treatment.—The hand should be soaked in warm water for some time to relax the soft parts as much as possible; then a piece of soft leather wetted should be placed closely around the first phalanx; and over this a tape, two or three yards in length, should be fixed by the clove hitch. An assistant should next firmly hold the metacarpal portion of the thumb, by passing his fore and middle finger between the patient's forefinger and thumb, whilst the surgeon draws the first phalanx from the metacarpal bone, in a direction somewhat inwards to the palm of the hand. The joint must be supported by a small splint and bandage, and the hand must be kept in a sling.

In cases of dislocation of the last joint of the thumb, instead of extending it, you had better try to bend it a little more, and that will humour the flexor tendon; and by only getting it so far bent that the proximal end of the last phalanx is raised up, you will have it in.—ABERNETHY.

Second Method.—Dislocation of the Second Phalanx of the Thumb.

Take a piece of bleeding-tape, and tie the middle part of it round the first phalanx, letting it cover a part of the end of the dislocated bone, and having the knot on the opposite side; let the surgeon twist both parts round his hand, and at the same time directing an assistant to support the patient's hand and fix the thumb. If extension be now made by the surgeon, the dislocated portion will readily pass into its place. This mode of proceeding is applicable to dislocations of the wrist, knee-joint, ankle-joint, and thigh-bone.

In obstinate cases, Sir C. Bell recommends the introduction of a couching needle obliquely under the skin, so as to cut one of the lateral ligaments; this will liberate the confined bone, and permit its easy reduction.

DISLOCATIONS OF THE BONES OF THE PELVIS.

None of the bones which form the pelvis are susceptible of a true dislocation. It is impossible that the os sacrum, enclosed between the two ossa innominata, can abandon the position in which it is confined by such powerful means.

Treatment.—In dislocation of the bones of the pelvis, a broad bandage of leather, softly quilted, and made to draw with buckles, or the India rubber webbing belt, ought to be put round betwixt the spine of the ilium and the head of the thigh-bone. Any inflammatory symptoms are to be combated by means of the antiphlogistic plan.

DISLOCATION OF THE OS COCCYX.

It may be displaced either outwardly or inwardly.

Dislocation outwards.

This injury may be supposed to exist, when, after delivery, the patient complains of severe pain striking over the region of the loins, especially at the junction of the os coccygis with the rectum; and particularly if, upon examination, the os coccygis be found to project and appear loose.

Treatment.—The surgeon must oil the fore and middle fingers of his right hand, and gently introduce them into the rectum, laying hold of the coccyx internally with them, and externally with the thumb. Thus he is to press and pull down the bone as much as possible, pressing at the same time the upper and dislocated end into its place with the left hand. It will always be necessary to support the parts for some days with compresses and the T bandage.

Dislocation inwards.

The patient complains of severe pain and tenesmus from a sense of fulness in the rectum, while the fæces pass with difficulty, and at times there is a suppression of urine.

Treatment. — We must follow the method recommended in external dislocations,—when the extension is made, to pull the bone outwards till we find that it has regained its place.

Case of Dislocation or Diastasis of the Sacro-iliac Symphysis. —The patient, a female, aged 35 years, of a slender and delicate form, received a violent blow on her sacrum, inflicted by her husband with his clinched fist. She immediately fell, and was unable to rise. Upon examination, Dr. Gibson found a considerable hollow over the upper part of the sacrum, produced by the unnatural backward projection of the posterior superior spinous process of the ilium. When the patient moved her right leg, an aggravation of the pain was experienced, accompanied by a distinct crepitation. The slightest motion conveyed an impression to her as if, to use her own language, her "hip-bones were separating."

Case of a Bricklayer. — The left os innominatum was dislocated and displaced upwards. The inflammatory condition of the parts forbade all attempts at reduction. After using for several days relaxing applications, and an antiphlogistic regimen, an attempt was made to replace the bones, which was opposed by a recurrence of pain, and followed by a return of the inflammatory symptoms. After some days we renewed the attempt at reduction, but with the same result, when it was determined to renounce all further efforts. After a prolonged rest, but shorter than could have been desired, the patient left his bed; and having commenced walking with the assistance of crutches, the weight of the limb corresponding with the injured side drew the displaced ilium downwards, and thus gradually effected a reduction. The patient ultimately recovered, and was enabled to resume his employment. — ENEAUX, HORN, and Prof. CHAUSSIER.

Louis relates a case in which the os ilium of the right side was found separated from the sacrum, so as to project nearly three inches behind it. It was caused by a heavy sack of wheat falling on a labourer.

DISLOCATION OF THE HIP-JOINT.

Dislocation of the femur may take place upwards and outwards on the external face of the ilium, upwards and forwards on the body of the os pubis, downwards and inwards on the foramen ovale, and downwards and outwards on the ischium.

Dislocation upwards and outwards, and that downwards and inwards, are the most frequent. Upwards and forwards is very rare; that downwards and backwards is still more so.

When a luxated thigh-bone remains long unreduced, a new joint is formed in the situation where the head of the bone is lodged; and a considerable degree of motion is regained. The acetabulum lessens in size, and is eventually obliterated.— When the luxation is upwards and backwards, an imperfect joint forms on the dorsum ilii; and of course the limb is considerably shortened, and the patient is very lame, walking principally on the toes and anterior part of the foot. If the luxation be forwards and downwards, the foramen thyroideum forms part of the new articulating cavity, and the limb being rather longer, the patient walks much better than in the preceding case.

Dislocations, upwards and backwards, on the Dorsum Ilii.

The affected thigh is shorter than the sound one; it is a little bent and carried inwards; the knee and foot are turned inwards, the knee being a little advanced upon the other; and the great toe rests upon the tarsus of the other foot. The trochanter major is brought nearer the anterior and superior spinous process of the ilium, and is at the same time elevated, and carried a little forwards. The head of the bone may be felt and seen to move upon the dorsum of the ilium, if the knee be rotated inwards. The attempt to stretch the limb is not successful without much force, and is very painful.

Treatment. — For the purpose of facilitating the reduction, many surgeons endeavour to produce a temporary faintness, by a copious venesection immediately before the extension is begun. After taking away ten, twelve, or even thirty ounces of blood (that is, if the patient's health does not forbid it), he is to be placed in a bath heated to 100°, and gradually raised to 110°, until faintness is induced. While in the bath, he should take a grain of tartarized antimony every ten minutes, until nausea is excited; when he is to be removed from it, put in blankets, and placed between two strong posts, in each of which a staple is fixed; or he may be placed on the floor, into which two rings may be screwed. A strong girth should then be passed between the thighs, close to the upper and inner part of the injured limb, and the ends of this should be fastened to one of the staples. A wetted roller should be placed tightly on the lower part of the thigh, just above the knee of the injured limb; and upon this a leathern belt, with straps and rings affixed for the attachment of the pulleys, should be closely buckled.

The knee should be slightly bent, and the thigh directed across the sound one, just above the knee. The pulleys must be attached to the straps of the belt, and to the other staple. The surgeon should now gradually and carefully commence the extension, and continue it until the patient begins to complain of pain; when he should rest a little, without relaxing so as to fatigue the muscles: having waited a short time, he should again draw the cord; and when the patient again complains, he should again suspend the extension; and so on until the muscles yield, and he finds the head of the bone is brought near to the acetabulum; when he should give the string of the pulleys in charge to an assistant, with directions to keep up the extension, whilst he himself rotates the knee and foot gently — under which motion the reduction will be usually accomplished. Sufficient elongation of the thigh is all that is absolutely necessary to reduction; but the elevation of the head of the thigh-bone over the brim of the acetabulum will be much facilitated by the rotation of the thigh, especially by a pretty forcible jerk of the heel outwards, when the head of the thigh-bone is brought to the level of the margin of the acetabulum. When the bone is reduced, it is prevented from leaving its place by bringing the thighs together by means of a bandage placed above the knees.

In the generality of cases, it will be advisable to adopt the antiphlogistic plan for a few days.

> If there should be any difficulty in bringing the head of the bone over the head of the acetabulum, you may pass your hand or napkin under the thigh, and lift it over the edge of the socket.

Downwards and inwards into the Foramen Ovale.

The affected thigh is longer than the sound one, the head of the femur being placed lower than the acetabulum; the greater trochanter is removed to a greater distance from the anterior and superior spinous process of the os ilium; and the thigh is flattened in consequence of the elongation of the muscles. When the patient is erect, the knee of the injured limb projects forwards, and the thigh is widely separated from the sound one, and it cannot be made to touch the knee of the sound extremity without great violence. The foot is widely separated from the other; but the toes are not either everted or inverted, but usually directed forwards. A hard tumour is felt at the inner and superior part of the thigh, formed by the head of the femur, which elevates the soft parts situated before the foramen ovale.

Treatment. — The patient is placed on his back, and the thighs separated from each other as much as possible. A girth is to be placed between the scrotum and upper part of the injured limb: let the ends be fixed to a staple in the wall of the room; then grasp the ankle of the dislocated extremity, and draw the limb over the sound one, and thus the head of the bone will slip into its proper cavity.

Another Way.

The patient is set upright on his breech, his thighs placed on each side of a strong pillar (previously having placed some soft substance around it). The extension of the thigh is accomplished by extending it at right angles with the trunk.

The head of the thigh-bone, by this operation, is relieved from its unnatural situation, and lifted, as it were, into its proper cavity.

DISLOCATION ON THE PUBES.

The limb is shorter; the great trochanter is raised higher, and the buttock sinks in; the knee, the leg, and the foot, turn a little outwards; but what renders it so evident, is the readiness with which the head of the bone can be felt a little above the level of Poupart's ligament, upon the pubes, on the outer side of the femoral artery and vein; it there forms a round hard swelling, which moves when the thigh is bent.

Treatment.—Place the patient on a table, upon his sound side; then pass a girth between the pudendum and the upper and inner part of the injured limb, and fix this to a staple rather before the line of the patient's body. The wetted roller, strap, buckles, and pulleys should then be placed above the knee. The extension is to be made backwards and downwards. The application of the towel at the upper part of the thigh, and lifting the head of the bone by it over the edge of the acetabulum, is also necessary in reducing this form of dislocation.

Backwards in the Ischiatic Notch.

The dislocated limb is shorter than the sound one; the natural projection of the trochanter major is wanting, and is inclined towards the acetabulum; a hard tumour is felt at the posterior and inferior part of the thigh; the knee and foot are turned inwards; and the great toe rests against the ball of the great toe of the sound limb. If the patient stands erect, the toe touches the ground, but the heel does not quite reach it, and the knee is bent and projects a little forwards.

Treatment.—The pelvis being fixed, the extension is to be made downwards and forwards, across the middle of the other thigh, so as to dislodge the head of the bone; while the surgeon, with a napkin placed just below the trochanter minor, pulls the upper part of the femur towards the acetabulum.

Displacement of the Head of the Femur from a partial or complete Destruction of the Brim of the Acetabulum.

In this displacement, the head of the femur is removed some way from its natural situation, viz. the cotyloid cavity, and rests upon the external iliac fossa; being, in fact, so far as position is concerned, strictly analogous to that which occurs in luxation of the femur backwards and upwards.

Spontaneous dislocations of the os femoris are those in which the head of the bone has been protruded by pus, granulations, or tumefaction in the acetabulum. It can occur only in cases of extensive disease of the hip-joint.

Congenital Dislocation of the Femurs.

A case is mentioned by one of the Continental surgeons. The subject was an old man seventy years of age. The thighs could not be separated from the body without describing with the feet a segment of a circle; the trochanters were more closely approximated to the ilia, and much more elevated than in its natural state. The heads of the ossa femorum were situated higher, the knees carried more inwards, and the thigh shorter than usual. A similar case is recorded by another Continental surgical writer.

Dislocations of the Patella.

This bone may be dislocated upwards, outwards, and inwards. The dislocation of this bone is easily ascertained by the unusual flatness of the knee on the fore-part, and the displaced patella being distinctly felt.

Treatment.—The bone is easily reduced by pressure when the extensor muscles of the limb have been completely relaxed. The inflammation, if any, is to be reduced by the application of leeches, cold water, or evaporating lotions; and, in the course of a few days, a roller ought to be applied from the toes to the knee. A laced cap for the knee is frequently used after the reduction of the bone, to keep it in its natural situation.

A dislocation upwards cannot take place without a rupture of the extensor tendon of the leg.

Lateral Dislocation of the Patella outwards.

The patella is found to have deserted the anterior part of the knee, and a depression is felt at the place where it is usually situated. The internal edge of the patella presents anteriorly, the external posteriorly; the anterior flat surface faces outwards, the posterior smooth articulating surface inwards, being thinly covered.

Treatment. — The reduction is easily effected by extending the leg, flexing the thigh on the pelvis, and pushing the luxated bone back to its natural position. Rest should be enjoined, and a bandage or laced knee-cap should be applied with a compress on the outside of the knee to prevent the escape of the bone from its central situation.

Lateral Dislocation of the Patella inwards.

The symptoms differ only in the situation of the bone.

Treatment.—The reduction is effected in a similar manner.

Remarkable Dislocation of the Patella. — The patella was dislocated in wrestling by a motion which the patient could not describe. There was a projection at the knee; the leg was permanently extended. The patella rested completely on its edge, its articular surface being turned outwards. The internal half of its circumference was fixed in the articular groove formed by the elevation of the sides of the anterior part of the condyles of the femur.

Treatment. — An assistant raised the thigh, and with one hand the surgeon bent the leg on the thigh, while with the other he turned the patella from within outwards. The reduction was effected in an instant, and was followed by slight swelling and weakness.

Internal Derangement of the Knee-joint arising from Dislocation of one or both of the Semilunar Cartilages.

This disorder may happen with or without contusion. In the latter case, it is readily distinguished. In the former, the symptoms are equivocal till the effects of the contusion are removed. — When no contusion has happened, or the effects of it are removed, the joint, with respect to its shape, appears to be uninjured. If there be any difference from its usual appearance, it is that the ligament of the patella appears rather more relaxed than in the sound limb. The leg is readily bent or extended by the hands of the surgeon, and without pain to the patient; at most, the degree of uneasiness caused by this flexion and extension is trifling. But the patient himself cannot freely bend, nor perfectly extend, the limb in walking, but is compelled to walk with an invariable and small degree of flexion. Though the patient is obliged to keep the leg stiff in walking, yet, in sitting down, the affected joint will move like the other.

Treatment. — The patient is placed upon an elevated seat, having nothing underneath it which can prevent the leg from being pushed backwards towards the posterior part of the thigh, and then extending the joint by the assistance of one hand placed just above the knee, while with the other the leg is firmly grasped. During the continuance of the extension, the leg is to be moved suddenly backwards, so that it may make as acute an angle with the thigh as possible. Immediately after this simple operation, the patients are in general able to walk without much inconvenience, and the joint soon regains its natural condition.

DISLOCATION OF THE KNEE.

The tibia, at its articulation with the condyles of the femur, may be dislocated anteriorly, posteriorly, and laterally, to either side of the knee.

Dislocation backwards.

The limb is shortened; a projection of the condyles of the os femoris anteriorly; a depression in the situation of the ligament of the patella; a bending of the leg forwards; and a projection formed by the extremity of the tibia is felt in the ham.

Dislocation forwards.

The tibia projects forwards; the thigh-bone is depressed, and thrown somewhat laterally as well as backwards; and the patella and tibia are drawn forwards by the rectus muscle.

Lateral Dislocation.

Those inwards and outwards are easily known from the deformity of the joint. — In the first, the external condyle of the femur is lodged in the internal cavity of the tibia, and the internal condyle projects and forms a tumour at the internal side of the knee; the contrary takes place in the second.

When they are complete, which is extremely rare, the tibia is carried entirely to the internal or external side of the femur.

Treatment. — Gentle extension and pushing the end of the tibia in the proper direction. The grand object after the reduction is to avert inflammation of the knee, and promote the union of the torn ligaments. The antiphlogistic regimen must be strictly observed, as well as the other means of preventing and subduing inflammation.

DISLOCATION OF THE FOOT.

The foot may be dislocated inwards or outwards, forwards or backwards, and the dislocation in any of these directions may be complete or incomplete.

Dislocation inwards.

The sole of the foot is turned outwards, and the back inwards; the other indications are, pain and inability of moving the foot, and the eminence formed below the internal malleolus by the astragalus. The fibula is generally broken about two or three inches above the ankle.

Treatment.—The patient is to be placed on a mattress on the side which corresponds to the injured limb; bend the leg at right angles with the thigh, so as to relax the gastrocnemii muscles; then fix the thigh, whilst an assistant draws the foot gradually in a line with the leg, and at the same time presses the lower extremity of the tibia outwards towards the fibula, to force it upon the articulatory surface of the astragalus. The joint is to be covered with compresses moistened with cold water or an evaporating lotion; and splints, which reach below the sole of the foot, are applied on the inside and outside of the leg. It may be necessary to adopt the antiphlogistic measures to keep within bounds the subsequent inflammation.

Dislocation outwards.

It is equally impossible to move the foot: the sole is turned inwards, and the back outwards, and the astragalus forms an eminence below the external malleolus.

Treatment.—The reduction is accomplished by relaxing the muscles of the calf, making extension in the axis of the leg, and pressing the lower head of the tibia inwards towards the astragalus. When reduced, apply the many-tailed bandage, and padded splints with foot-pieces. A pad is to be placed upon the fibula, just above the outer angle, and extending a few inches upwards; so as in some measure to raise that portion of the leg, and prevent the tibia and fibula slipping from the astragalus, as well as lessen the pressure of the malleolus externus upon the integuments.

Dislocation forwards.

Diminution of length in that part of the foot between the lower part of the leg and the anterior extremity of the toes, elongation of the heel, tension of the tendo Achillis, and relaxation of the extensors of the toes. The foot cannot be bent or extended.

Treatment.—The patient is to be placed on his back upon a mattress, and the thighs being elevated towards the abdomen, the leg is to be bent at right angles with the thigh; the foot is then to be extended in a line a little before the axis of the leg, the thigh being fixed, and the tibia pressed backwards to its natural position. When the dislocation is reduced, the same means are to be employed as directed in the former cases. The position of the limb should be upon the heel, with the knee bent and the foot well supported.

Dislocation of the Toes.

The bones of the tarsus, metatarsus, and toes are to be treated as recommended for the bones of the fingers.—Sometimes one or more toes are dislocated by the relaxation of their tendons, and become very much deformed, and so inconvenient to the patient, by impeding his walking, as frequently to require amputation. Boyer has proposed the removal of a portion of the extensor tendon belonging to the affected toe, to relieve this deformity.

DISLOCATION OF THE PERONEUS LONGUS MUSCLE.

By a sudden and inordinate action of the peroneus longus, its tendon may burst the sheath which confines it behind the malleolus, and dislocate itself upon the lower extremity of the fibula, upon which it may readily be felt lying in a diagonal direction across the bone.

Treatment. — The foot is to be extended, and the tendon pressed back into the groove behind the outer malleolus, where it is to be confined by strips of adhesive plaster, carried around the foot, ankle, and leg, and further secured by compress and bandage, until the ruptured sheath becomes reunited.

FRACTURES IN GENERAL.

Fracture is defined a solution of continuity of one or several bones resulting from a force of extension disproportionate to and exceeding their natural extensibility. Fractures differ from one another as to the bone affected; as to the part of the bone; as to the direction of the fracture; as to the relative position of the fractured portions; and as to the attending circumstances, by which the fracture may be either simple or complicated.

The bones are more or less subject to be broken, according to their position, their office, and the age or youth of the patient. Some diseases increase the fragility and weakness of the bones, and thereby facilitate the occurrence of fractures.

The causes of fractures are divided into predisposing and remote. The symptoms are the crepitus †, the separation, and inequalities of the ends of the fracture: when the bone is superficial, the change in the form of the limb, and the shortening of it.

The stethoscope applied over the place of fracture, on the slightest motion of the part, conveys a much more decided crepitus than is perceived by the naked ear during the most extended movements of the part. In many cases, even the slight pressure of the ear on the stethoscope suffices to produce the crepitation, — a circumstance of no small importance, as freeing the patient from the pain necessarily excited by the motion requisite in the manual examinations. The crepitus yielded by the more solid bones is sonorous, and resembles the sound produced by breaking a piece of wood across the knee; it is accompanied with a sensation of roughness unpleasant to the ear. The sound yielded by the spongy bones is duller, and resembles the effect of a rasp on wood; except that, now and then, this noise is broken by sounds of a clearer kind, like those afforded by the compacter bones, only not so loud.

The crepitus is loudest over the place of fracture, and gradually diminishes as we recede from this; but it may be heard at a great distance from the fracture, when this is in the compact part of a long bone. In the case of fracture of the femur, the crepitation may be heard even on the skull.

From this it will appear that the precise place of the fracture is easily ascertained. The sound from oblique fractures is stronger than from those which are transverse; but when one end of the fractured bone rides the other, the sound is then obscured, and in some cases may not be perceived without slight extension or counter-extension of the limb. If the fracture be comminuted, the sensation, as of distinct portions of bone, is conveyed by the stethoscope. When fluids are effused around the fracture, a guggling is combined with the crepitation, and is compared to the sound produced by a shoe full of water. When the fracture is compound, there is conjoined with the crepitation a sound of blowing, something like the sound of the forced respiration made with the mouth open. In dislocations, the sound is dull and obscure, and conveys precisely the impression of two moist and polished surfaces sliding over one another.

Treatment. — Reduce the pieces of bone into their natural situation.

Coaptation, or setting of the reduced fragments, ought to be executed with all possible accuracy and attention, for on it the future shape, and perhaps usefulness, of the limb may in a great degree depend.

Accurate anatomical acquaintance with the structure of the parts concerned will here be the surgeon's best assistant: some information may be gained by carefully comparing the affected with the corresponding sound limb.

Secure and keep them in this state until they are restored to their pristine condition, through the medium of callus.

Dissection of a recent Fracture.—The first appearance which presents itself is an extravasation of blood extending along the whole limb, and covering the muscle and the fracture. The blood thus extravasated, has been supposed by some to have some part in the re-production of the bone and the formation of the callus. The blood appears to come principally from the medullary structure of the bone, not from the vessels of the osseous substance itself, because the blood is not found on the edges of the bone. Exuded blood is thus supposed to be the basis of union; the red part becomes absorbed, and the remaining portion converted into gelatine. The periosteum inflames and becomes thickened; and in the gelatine effused beneath it, the first points of ossification may be observed, not close to the fracture, but at some distance from it, on the surface of the periosteum, and not on that of the bone. The central portion of the callus between the fractured extremities becomes ossified last, and not until the new periosteum, as it appears, has formed from the cellular membrane of the circumjacent muscles. The new periosteum is at first thick and loose, but connected with the callus. The points of bone appear at first rather externally, than in the middle of the gelatine. The regenerated bone runs through the same stages as the original bone.

Prevent any unpleasant symptoms likely to arise, and relieve them when they have come on. The former is accomplished by extension, counter-extension, splints, and bandages;

It is very material carefully to attend to the proper time of operating the extension: it should always be performed as soon after the accident as possible, previous to the accession of the tension and inflammation.

Dr. Smith's Splints for fractured Limbs. — These splints are to be made of hatter's felt, which is to be saturated with shallac varnish. Moulds formed of plaster of Paris, or of carved wood, may be employed to give the varnished felt the proper shape. The felt is to be cut of such a size as to form a splint which will embrace rather more than one half the limb: when the varnish is dry, these splints are sufficiently stiff to retain the form given to them. To adapt them to a fractured limb, they are to be held over the steam of boiling water, which will render them sufficiently pliable to admit of their being moulded by the hand, and acquiring their final form from the limb itself.

Counter-splints are placed on the opposite side of the limb; these counter-splints have buckles attached to them, which receive straps from the splints to secure them in their place. These splints, when properly applied to the fractured limb, prevent its shortening, and all motion between the divided ends of the bones; and, as the splints can be exactly fitted to limbs of every kind and description, a bandage may be firmly applied without causing pain, excoriations, swelling, or other bad consequences arising from the unequal pressure of the splints.

Baron Larrey encircles the whole of the member with compresses and bandages soaked in gummy or albuminous substances, which, on drying, form a complete, immovable, and inflexible case for the injured limb.

This he applies whether the fracture be simple or compound; and never takes it off till the cure is completed, whatever may be the degree of swelling, infiltration, or even suppuration, that supervenes.

the latter by the antiphlogistic system, and by position.

The necessity of guarding against disturbance of the fractured portions in passing the natural evacuations cannot be too strongly insisted upon; for if the fractured parts be moved against each other as often as it becomes necessary to obey the dictates of nature, union cannot be expected: and even when every precaution is taken, the difficulty of preserving for weeks, or rather months, the fractured surfaces in perfect and undisturbed contact is so great, it is only under a combination of favourable circumstances that union can be effected.

COMPOUND FRACTURES.

A wound communicating with the cavity of a broken bone, in which sense the term compound fracture is generally understood may be produced by external violence, or by the protrusion of the bone itself. In the latter case the bone is usually broken in a very oblique direction, though it sometimes happens that a very obtuse fragment will penetrate the integuments and produce an extensive wound.

The bones are all liable to compound fracture; but the long or cylindrical ones, especially those of the leg, are most apt to suffer.

Unless combined with other injury, the mere protrusion of the bone does not necessarily increase the danger of the case, for it often happens that the wound heals by the first intention immediately after the fragments are replaced. A complicated fracture is not necessarily accompanied by an external wound or a protruded bone, and in this respect among others differs from a compound fracture. An open wound, however, conjoined with luxation or with a lacerated artery, will generally exasperate all the symptoms which, at any rate, are always liable to terminate most unfavourably.

Treatment.—If the external wound be slight, and the hæmorrhage inconsiderable, it will be sufficient to replace the bones, and apply the dressings for simple fracture: merely covering the wound with a piece of lint or adhesive plaster.

Never use any violence in bringing into contact torn up integuments, let them be coaxed gently together, or as near as they can be, and retain them by the simplest means; let your bandages be applied with the view of support, not compression.

On the contrary; when the bones have been extensively shattered and their ends project several inches beyond the wound, whilst the surrounding soft parts are lacerated and mangled, and the blood is streaming from the limb, a very different course should be pursued. To replace the bones under these circumstances, will sometimes be found very difficult, but the surgeon should always make the attempt before he ventures to dilate the wound or saw off the bones. By well directed and gentle efforts at extension and counter-extension the fragments may often be restored to their places; if these fail, then the soft parts which appear to bind the bones and prevent them from yielding may be slightly divided, and other trials by extension made. Should every endeavour of the kind prove fruitless, there can be no other resource than to cut off the bone; though it must be obvious that such an operation can very seldom prove necessary, and must always be attended with disadvantages, inasmuch as the limb will probably remain shortened, or months elapse before the bone is regenerated. After the bones are replaced, it generally happens that the hæmorrhage stops; should the blood, however, continue to flow copiously, it may be necessary to dilate the wound and search for the vessel, which must be secured by the ligature or compress. Instead of confining the limb by splints and rollers, it should be placed on a pillow, and surrounded lightly with the bandage of Scultetus, and every care taken to obviate and remove inflammation. After this has subsided and the wound begun to heal, splints and the usual dressings may be applied.

The Method of applying the Junks in Compound Fracture and Gun-shot Fracture of the Thigh or Leg.

A sheet is spread out and folded in a square form, and of extent to reach from the groin to the heel: as much long straw as you can grasp with the hand is put down on the two opposing margins of the sheet, and the edges of the sheet are rolled over the straw, so as to form two long bundles. The sheet thus prepared is kept under the fractured limb without disturbing it, and then the junks or bundles are rolled towards the leg, until they are brought up to it and parallel with it. Then the portions of a bandage laid double are passed under the limb and the junks, and being brought round, they enable us to draw the limb and the junks together, so that the fractured bones are kept straight by the junks lying on each side of them and without hurting the limb in its tender condition, or in any way interrupting the circulation.

FRACTURES OF THE SKULL.

The bones of the cranium being beat in by external violence, diminish its cavity by the depressed pieces occupying some of the natural space allowed for the brain. The blood effused in consequence of fractures may have also the same effect, so that in either case compression of the brain is the consequence; when this takes place its functions are obstructed, an apoplectic stertor of breathing comes on, loss of voluntary motion, convulsions, tremour, involuntary discharge of the urine and fæces, giddiness, dimness of sight, dilatation of the pupil; sometimes a hæmorrhage from the nose, eyes, and ears occurs; and sometimes the fracture of the bone may be distinguished through the external wound in the integuments. In some cases, however, fracture of the bones of the cranium occurs without any external wound.

The symptoms attending compression of the brain occur also in concussion, but in a compressed state of the brain they are more permanent. There is also an apoplectic stertor in the breathing, which is always wanting in patients labouring under concussion, for they seem in a sound sleep. The pulse is also soft, and equal in concussion, and not irregular and slow as in cases of compression.

When a tumour, however, arises from a recent contusion attended with the above symptoms, there can be no doubt of the existence of a fracture.

Ecchymosis taking place in consequence of a blow on the scalp, sometimes produces an appearance and feel, a little resembling a depressed portion of bone; this may usually be distinguished from a depression, by its having a more regular edge, and being on the whole more extensive.

Tranverse Fracture through the foramen magnum, &c.

If there is a transverse fracture through the foramen magnum, cuneiform process, and part of the temporal bone, a discharge of blood into each meatus auditorius takes place; and when there is no other mischief, deafness often remains for life.

Fracture of the Skull over the frontal sinus.

Should the skull be fractured over the frontal sinuses, when the fracture is simple, if the nose be blown the air escapes through the opening in the bone, and getting into the cellular membrane under the skin, renders the forehead emphysematous. If, on the other hand, the fracture is compound, upon blowing the nose the air rushes through the wound.

The integuments are to be opened with a lancet, to let the air escape.

Treatment.—The treatment of fractures of the skull will depend more or less on the symptoms which present themselves.

In the first place, when there is a simple or compound fracture, unaccompanied with symptoms of injury of the brain, the trephine must not be used. In these cases let the treatment be constitutional depletion, by means of blood-letting and purgatives; and if there be a wound in the scalp, endeavour to heal it as quickly as possible by the application of adhesive plasters.

Fracture with Depression.

If the fracture be simple, and there be no wound in the scalp and no symptoms of injury to the brain, you must not trephine. Even if there be symptoms of injury to the brain, and the fracture is simple, do not immediately have recourse to it; take away blood, purge your patient freely, and see how far the symptoms may be the result of concussion of the brain and not of depression. When, however, fracture with depression is of the compound nature, you should trephine without delay, or elevate the depressed portion of the bone; for, as these cases are usually attended with inflammation, you must not wait till the inflammatory symptoms come on, but at once proceed to remove the cause of depression.

If the edge of the depressed bone be embedded in the substance of the brain, it may be proper to restore it to its natural level, provided this can be readily accomplished by the forceps or elevator. But individuals have recovered in whom a depression of bone has been allowed, under these circumstances, to remain without being elevated; but it cannot be advisable to risk this chance of recovery, whatever it may be, if the elevation require the application of such a degree of force as is likely to cause the most trifling additional injury to the wounded brain. The motion of the saw must occasion more or less jar to the tender substance; and this, which may be of little consequence where the brain and its membranes are entire, may make a serious difference as to the degree of danger where these parts are already lacerated and contused.

The operation of Trephining.

The patient must be laid on a table on a mattress, while his head is placed upon a pillow, and secured by an assistant. The hair being previously removed, an incision is to be made through the integuments down to the bone, and if a longitudinal incision should not sufficiently expose the surface, it may be crossed by another, and extended in any necessary direction.

The bone being exposed and the hæmorrhage suppressed, the centre pin of the trephine is to be fixed upon the sound bone, as near to its fractured edge as it can with safety; the pin serves the purpose of guiding the saw, which, being worked steadily backwards and forwards for a few minutes, forms a track or gutter for itself, in which it will afterwards run without the assistance of the pin.

The trephine is never employed unless the depressed bone cannot be restored to its natural situation, or removed by the elevator, or Hay's saw. If any large arteries be divided during the operation, they may be taken up by the tenaculum or needle.

During the progress of the operation the pressure on the instrument should be equal, so that it will penetrate through the bone in a regular manner and divide it evenly. The saw ought to be frequently removed to examine what depth it has penetrated, and every time it is removed it is to be rubbed with a small brush, or wiped with a cloth. As soon as the diploe is wounded, it is necessary to proceed with great caution, on account of the inequalities in the thickness of the inner table of the skull, in consequence of which one part may be completely cut through before the other is nearly divided. The tooth-pick is the most convenient probe for ascertaining the depth of the groove; but when the trephine reaches the tabula vitrea, and has made some little impression upon it, it is safer to attempt to break out the circular portion of bone by means of the elevator, than to proceed completely through it with the saw. In very young or old people a few turns of the saw are sufficient to penetrate both tables of the cranium.

Dr. Monro advises, in the operation of the trepan, that the cranium should not be entirely cut with the saw, but that the operator should desist from sawing when the innermost lamella becomes so thin that it can be easily broken off with a levator or forceps, by which we not only avoid the danger of the instrument pressing rudely on the brain, but also in many cases the cutting of the dura mater.

Fractures of the Nose.

The bones of the nose, in consequence of their exposed situation, are often fractured. The cause of the fracture is always applied immediately to that part where the solution of continuity takes place, and the fracture may be oblique, longitudinal, or transverse, without derangement of the fragments; but it more frequently happens that the bones are splintered and crushed into the cavity of the nostril, the nose loses its natural form, and the neighbouring soft parts are much bruised by being crushed between the bones and the cause of the fracture, whether this be a body against which the nose has been forcibly struck, or one which may have been strongly impelled against it.

Treatment.—The patient must be laid on his back opposite to a window, with his head and shoulders a little raised. The director, spatula, or female catheter, must be introduced into one of the nostrils; first, into that in which the bone is most depressed, with the right hand, while the left is employed in elevating the bones, and the fore finger and thumb of the right in putting them again into their proper situation; if necessary, we must do the same to the other. In general they will retain their situation without any further assistance; if not, the fractured portion may be supported by the introduction of lint.

Fracture of the Vomer.

Treatment.—Introduce the forceps, or a female catheter, through one of the nostrils, establish a point of compression on the other side; and in this way replace the fragments. Plug the two nostrils, so that the nose leans to neither side.

Fracture of the superior Maxillary Bone.

Fractures here are attended with inflammation of the eyes and opening into the antrum: the latter occasions much deformity.

Treatment.—Consists in obviating inflammation, an accurate replacement of the parts, and attention to the wound, if any. The first is done with the finger, or a pair of forceps or spatula; and the wound, when dressed, is generally retained by adhesive plaster. When large portions of the alveolar process to which teeth adhere have been broken, and remain only attached to the soft parts, it has been proposed to replace the fragments, and secure them by fastening the insulated teeth with silk or thread to those in the sound part of the bone.

> *Ledran* met with an interesting case of fracture of the upper jaw, in which four of the dens molares, with their alveoles, to which they still adhered, were forced into the mouth and lodged under the roof. The wheel of a cart passed over the man's head, from the processus mastoides over the upper jaw, beneath the processus zygomaticus.

Fracture of the Lower Jaw.

Fractures of the lower jaw may be either perpendicular to its basis, oblique, or longitudinal; of the latter, examples have been known in which a portion of the alveolar process, with the teeth in it, was detached from the rest of the bone. To examine the jaw-bone, we place the fingers of the left hand on the angles of the bone, and then take hold of the alveolar part of the jaw-bone in front, and endeavour to move it laterally; in the meanwhile, we keep the eye on the teeth, when we easily discover whether there has been any fracture of the lateral part of the bone; or we feel and press along the base of the jaw.

Looking into the mouth, the teeth will be found irregular, and oftentimes loosened.

In boys, there is sometimes a splitting of the lower jaw at the symphysis, which is not so readily ascertained. The patient has, perhaps, fallen from a height, he has lost one or two of the front teeth, or they are loose, and a greater space than natural is betwixt them.

By taking hold of the alveolar part of the jaw, with the finger and thumb on each side the symphysis, the fracture is at once ascertained by the usual symptoms.

When the chin has been insulated by a fracture on each side of it, it will be drawn downwards considerably below the level of the adjoining fragments by the action of the muscles of the throat inserted into its point.

Fracture of the neck of the condyloid process may generally be distinguished by the grating noise and pain produced in the neighbourhood of the ear when the jaw is moved, and by the circumstance of the condyle being dragged forward by the action of the pterygoideus externus muscle. Dr. Physic has seen two cases where the jaw-bone had been fractured in the direction of its basis.

Treatment.—Fractures of the lower jaw, whether simple or double, are easily set by pushing the displaced part upwards and a little forward, and then pressing on the basis of the bone so as to bring it exactly on a level with the portion which has preserved its natural situation. The correctness of the reduction can always be rightly judged of by attending to the line which the base of the jaw ought to form, and observing that the arch of the teeth is as regular as nature will allow.

The maintenance of the reduction however is difficult, and can only be well executed by supporting the lower jaw, and keeping it applied to the upper one. As soon as the fracture is set, a piece of pasteboard is to be cut into such a shape as may be accommodated to the chin and jaw; it is to be notched round the edges and then moistened, so that being applied on the lower part of the chin it may be brought up on the base and sides of the jaw on both sides. Over this is to be applied the four-headed roller, the centre being placed on the patient's chin, while the two posterior tails are pinned to the front part of the nightcap, and the two anterior ones fastened to a part of the same cap, more backwards. In fractures of the condyles of the jaw, that process is drawn forwards by the pterygoideus externus muscle; as it is very short, there is no means of obviating this, and it becomes necessary therefore to push forward, and keep in that situation, the inferior fragment; in order to effect which, before applying the bandage, as has been directed, a compress is to be applied behind the angle of the jaw, extending nearly up to the ear. This compress, when the roller presses tightly on it, will keep the inferior fragments advanced sufficiently to reach and remain in contact with the upper. In fractures of the condyles, it is particularly necessary for the parts to remain at rest, as motion has sometimes prevented the reunion of the fragments, and the condyle has exfoliated. Until the bone is united, the patient should be allowed only such food as does not require mastication, and it may be given by means of a small spoon introduced between the teeth: broths, soups, jellies, tea, and other slops appear most eligible. In compound fractures of the jaw, where there is a necessity for inspecting the wound frequently, we must take the utmost care to prevent the bones from being displaced; for which purpose, an assistant should support the parts with his hands while the bandage is taking off and applied anew.

FRACTURE OF THE SPINE.

The bodies of the vertebræ are not fractured by blows, but by falls, in which the whole body is twisted; as when a bank of earth falls upon and buries a man. This fracture will not be known by the crepitation like a common fracture of the limbs, but only by derangement of the projecting spinous processes while yet they are not separated as in dislocation, nor crushed and crepitating as when they are themselves fractured, or as when a blow upon them has crushed the arch of the bone. As the symptoms and result of the accident differ according to the situation of the fractured bones, these injuries may be divided into two classes; first those which occur above the third cervical vertebre, and, secondly, where the injury is below that bone. In the first cases, death is generally the immediate result, if the displacement be to the usual extent. In the second, death takes place at various periods after the injury, but is generally consequent upon it. The origin of the phrenic nerve, from the third and fourth cervical pair, is the reason of this difference; for as the parts below are paralysed by the pressure upon the spinal chord, if the accident be below the fourth cervical vertebre, the phrenic nerve retains its function, and the diaphragm supports respiration; but if, on the contrary, the fracture be situated above the origin of this nerve, death immediately ensues. It is true, that a small filament of the second cervical nerve contributes to the formation of the phrenic, but it is in itself insufficient to support respiration under fracture of the third vertebre. The effects which arise from a fracture and displacement of the spine, below the origin of the phrenic nerve, depend upon the approximation of the accident to the head. If the lumbar vertebræ be displaced, the lower extremities are rendered so completely insensible, that no injury inflicted upon them can be perceived by the patient.

An exception to the general rule is mentioned by Dr. Dorsey, of a gentleman who was shot by a pistol presented close to his face, the ball entered his mouth, and shattered the atlas vertebre; notwithstanding which he survived the accident three weeks, and no symptoms of paralysis occurred, though the pus and the ball were in contact with the dura mater.

Fracture of the Spinous Processes of the Vertebræ

Is seldom followed by any serious consequences, unless accompanied by violent concussion or some other injury.

This injury will be ascertained by an examination, the spinous processes will be felt loose, and project so as to present the appearance of a distorted spine.

Fractures of the vertebræ have been confounded with their dislocation. The slightest movements suffice to make the crepitation distinguishable by means of the stethoscope. It is always more distinct on the fracture, and ordinarily is only heard at a short distance from this point.

Treatment of Fracture of the Vertebræ.

Any attempt to set fractures of the bodies of the vertebræ, even were they known to exist, would be both useless and dangerous. For in whatever way the vertebræ are broken, the danger of moving the body must be apparent, since in every change of posture or turn of the body the broken bones may be thrust against the spinal marrow. General treatment can alone be employed: cupping or leeches will tend to prevent inflammation in the situation of the injury. In case of flatulent distension of the abdomen, vomiting, hiccough, &c., the belly may be rubbed with camphorated linaments, and purgative clysters and antispasmodics given. The urine must be drawn off frequently by the catheter. In fracture of the spinous processes, the surgeon must replace the bones with his fingers, securing them in their places by a compress and napkin tied firmly round the body, and further secured by a scapulary.

Operation of the Removal of Portions of three Dorsal Vertebræ for Paralysis from Fracture. — I made an incision about five or six inches in length along the spinal ridge, and then two deep incisions transversely to, and at each extremity of the former, and three inches and a quarter in length all down to the bone. I then dissected all the muscles and ligaments as far as the heads of the transverse processes, and scraped the bone clean; the fragments being pressed to one side, but so completely united, and so smooth on the upper surface, that the line of separation was not very well marked. I next took a small Hay's saw, and made an incision on both sides, as near the base of the transverse processes, and as deep as I could with safety to the spinal marrow and the nerves going off at the sides, and long enough to cut through the bone above, about half way, which was the third dorsal vertebre. I then sawed off the end of the transverse process of the second, and into the transverse process of the third, about half its base. Then taking a very strong tooth forceps with its ends turned on one side, and getting a claw in each incision made by the saw, I was enabled to break up the external plate and part of the internal, so that I could now, with a small strong pair of forceps or pliars, break by a small piece at a time the whole of the bone that I had cut round with the saw. After removing a part of the spinous processes of two vertebræ, half of the third and the whole of the fourth, I brought the parts together putting a tent at the bottom. — *Dr. G. Smith, of America.*

Fracture of the Sternum.

Fractures of the sternum may be occasioned in three ways: either by a direct blow; by a fall upon the back, giving rise to a contre coup; and lastly, the violent opposed actions of the sterno-pubic and sterno-mastoid muscles. A fracture of the sternum is rendered obvious by the inequalities perceptible, when the surface of the bone is examined with the fingers, by a depression or elevation of the broken pieces, a crepitus, and an unusual movableness of the injured part in respiration. The breathing is difficult, and mostly accompanied with cough, spitting of blood, palpitations, and inability to lie on the back. When the sternum is fractured across, there is a perpetual grating of the broken parts of the bone, and this grating produces inflammation and suppuration under the bone, viz., in the anterior mediastinum. Fracture of the sternum, from muscular action only, is of a very rare occurrence. A physician of Paris has met with two cases, which took place during labour, and was followed by the death of the patients.

Treatment.—Fractures of the sternum, when mere solution of continuity only, require common treatment; viz., a piece of soap plaster on the injured part, and a roller round the chest, but it must be made so firm as to prevent the respiration being performed by the motion of the thorax: the motions of the thorax must be entirely suppressed by the bandage, and respiration performed by the diaphragm alone; quietude, bleeding, and a low regimen, with a view of preventing what may be considered as the most dangerous consequence, inflammation of the parts within the chest.

Spontaneous transverse Fracture of the Sternum. — The patient, a woman aged 37 years, of a healthy constitution, was in the act of lifting a heavy weight of olives into a cart; the head and body were forcibly thrown back to enable her to rest the weight partially on the stomach; and, while making the effort to raise it higher she felt as it were, a crack at the middle of the sternum; this was followed by an acute pain, which forced her to press upon the part with her hands. A fracture was at once detected by the surgeon, and the lower portion of the bone was found to be projecting, and the upper one to be depressed.

Treatment. — Compression and a bandage were applied, and in the course of a month the union was complete.

FRACTURES OF THE RIBS.

A fracture of the ribs, which are not at all displaced, is very difficult to detect, particularly in fat subjects. The surgeon should place his hand on the part where the patient seems to experience a pricking pain in the motions of respiration, or where the violence has been applied.

The patient should then be requested to cough, in which action the ribs must necessarily undergo a sudden motion, by which a crepitus will often be rendered perceptible.

Treatment. — When a rib is broken, we have only to keep it from moving by preventing the motion of the chest in respiration: for this purpose, after a piece of soap plaster has been applied to the side, and over it proper compresses, a broad linen roller is to be firmly put round the chest, so as to impede the motion of the ribs, and compel the patient to perform respiration chiefly by the descent and elevation of the diaphragm. If there should be any disposition to inflammation of the chest after the accident, copious and repeated bleedings should be practised as soon as possible.

Compound Fracture of the Ribs.

Will not readily happen, in consequence of the ribs projecting; for the ribs are, in truth, beaten in when fractured. Where they are forced inwards, it is often accompanied with a puncture of the lungs, or rupture of the intercostal artery. If the patient complain of a difficulty of breathing, with oppression in the chest, and if a tumour on the broken rib succeed to this, which crackles under the finger, it is the emphysematous tumour, so peculiarly characteristic of this accident. A discharge of blood, mixed with froth, from the mouth is a sure sign that the lung or lungs are wounded.

Treatment. — Emphysema is to be relieved by a few decided incisions, or punctures, made with the shoulder or point of a bleeding-lancet, as near the seat of injury as possible. After the cellular substance is emptied of the air, the point where the broken rib is should be pressed with a firm compress, to assist the adhesion of the lacerated parts surrounding the fracture, and over this the roller. The best bandage is an elastic belt, made (four or eight inches broad) of India rubber: it yields gently to the action of breathing, and does not incommode the patient with any cord-like tightness.

If there be loose and shattered ribs from a gunshot wound, these must be picked away carefully, or if not easily got at, the wound may be moderately enlarged. It is to be closed as soon as possible after the removal of the splintered bones, by means of adhesive straps; over these lint, and a slight compress, secured by a roller. Blood-letting must be repeated according to the urgency of the case, and indeed can hardly be carried too far: for if the patient be not relieved by this measure, no other can possibly save him. During the cure, purgatives, digitalis, low diet, and occasional doses of Dover's powder to relieve the cough, will be found extremely useful.

The India rubber webbing made by Messrs. Seivier and Co., Holloway, is admirably adapted for severe injuries of the chest, abdomen, and pelvis; no surgeon should be without this highly useful article.

Excision of Carious Ribs.[*] I began by enlarging the wound, giving it a crucial form, and thus exposed the extremity of the sixth rib, which appeared swelled and rough, for four inches in length. Having cut the intercostal muscles with a probe-pointed bistoury, carried along the superior and inferior margin of the rib, I sawed the bone at the extremities of the diseased portion, with a small saw, the cutting edge of which was not above fifteen lines in length. This done, I detached the cut portion from the pleura, by means of a common spatula. I found this part of the operation easier than I expected, owing to the pleura being thickened under the bone, as the event of the operation has proved.

The seventh rib was exposed for the same length, and was detached in the same manner; but with much more difficulty, and not without some slight laceration.

It now evidently appeared, that the pleura was diseased; it was thickened, spongy, and gave rise to the excrescence in that part which separated the two portions of the ribs that had been removed. The cancerous state extended above the sixth rib in so much that eight square inches of the membrane seemed to be diseased. Not to extirpate this was to leave incomplete an operation which had lasted for twenty minutes, and, till that moment, been attended with success. Each of the assistants provided himself with means of stopping hæmorrhage, which we feared would be terrible the instant I should cut the intercostal arteries. I cut out the pleura with a pair of scissars with curved edges; and, whether the incision made by this instrument (which divides rather by pressing than cutting, and bruises what it divides) had caused the vessels to contract, or whether their calibre had been diminished by the previous cauterizations, not a single drop of blood was lost; but at this moment the external air rushed into the chest. Pushing violently back, and compressing the left lung, which, together with the heart, contained in the pericardium, were forced towards the opening, I endeavoured, by applying my left hand to it, to moderate the entrance of the air, and prevent the suffocation, which seemed imminent, while, with the right, I covered the wound with a large compress, smeared with cerate. The entrance of the air was immediately checked by this application, which was large enough, not only to cover the wound, but the whole side of the chest. I placed over it a large pledget of charpie, covered with cerate, then a few compresses, and supported the whole with a bandage, applied pretty tight. The patient returned home on the twenty-seventh day after the operation.

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[*] Richerand.

FRACTURES OF THE SCAPULA.

Fractures of the Acromion Process.

In this accident, when the shoulders are compared, the roundness of the injured side is lost, and, part of the attachment of the deltoid muscle being broken off, the head of the os humeri sinks towards the axilla, as far as the capsular ligament will permit.

On tracing the acromion from the spine of the scapula to the clavicle, just at their junction, a depression is felt from the fall of the fractured portion. If the distance be measured from the sternal end of the clavicle to the extremity of the shoulder, it will be found lessened on the injured side.

If the surgeon raises the arm from the elbow, so as to put the deltoid muscle in motion, the natural form of the shoulder is directly restored, but the deformity returns the moment the arm is again suffered to fall. This accident may be distinguished from a dislocation, if the surgeon raise the shoulder by pushing the humerus upwards, when a crepitis will be perceptible to his hand applied over the acromion, on the limb being rotated.

Longitudinal Fractures of the Scapula

Cause very little derangement, because the muscles which are attached to the surface of the scapula prevent the separation of the fractured portions.

Transverse Fractures of the Scapula.

The derangement is not so trifling. The serratus anticus major draws forward the lower portion, to which it is principally attached. The rhomboides may also concur in producing this derangement, which is always great enough to be perceived by the fingers drawn along the base or internal side, where the inequality will be produced.

Fractures of the Acromion and Inferior Angle.

The consequences are more important. The weight of the arm and the contraction of the deltoid muscle draw downwards the acromion, at the same time that the trapezius and levator scapulæ draw the rest of the bone upward and backward. The serratus anticus major draws forward the lower angle, the rest of the scapula remaining in its natural situation; or if the angular portion be considerable, the teres major and some fibres of the latissimus dorsi contribute to its derangement forward and upward.

The beak of the coracoid process affords attachment to the pectoralis minor, the coraco-brachialis, and short portion of the biceps. Hence it follows that these fractures must interfere with the inspiratory movements of the thorax, those of elevation and adduction of the arm, and the depression of the shoulder.

Treatment.—In fracture of the acromion scapulæ, we raise the arm and relax the deltoid muscle, and examine and replace the pieces of the bone. The arm being allowed to fall gently to the side, the fore-arm is to be suspended in a handkerchief, so that the head of the humerus may be made to rise and push up the extremity of the broken acromion in such a way as to preserve it in its place. As soon as the swelling has subsided, the spica bandage may be put on. The middle of the double-headed roller is put under the armpit of the opposite side; the ends are brought up and crossed on the top of the wounded shoulder; then crossed under the armpit of the same side; and carried across the back and breast; the heads of the roller are again crossed under the armpit of the opposite side, and carried upon the injured shoulder again; this is repeated until the shoulder and the broken bones are covered with a firm lacing of the bandage.

Treatment of Longitudinal or Transverse Fracture of the Body of the Scapula.

All that is requisite is to fix the arm to the side of the trunk by means of a bandage which includes the arm and trunk, and which descends from the shoulder to the elbow.

Treatment of Fracture of the Inferior Angle.

It will be necessary to act on the scapula itself, to push it downwards and forwards toward the inferior fragment, which the serratus anticus major has drawn in that direction.

In this case, too, it is on the arm that it will be necessary to act in order to move the scapula. The arm is to be pushed inward, downward, and forward; the fore-arm being half bent, it must be kept in this position by a circular bandage several yards long.

Fractures of the Cervix Scapulæ.

Fractures of the scapula most frequently happen at its cervix, and in this situation it has all the characteristics of a dislocation of the shoulder, for which it is not unfrequently mistaken. The shoulder is sunk, and a hollow is perceived under the processus acromion. It is distinguished by rotating the arm with one hand, at the same time applying the other to the neck of the scapula, when both bones will partake of the rotatory motion, and generally a crepitis may be perceived.

Treatment.—The shoulder must be firmly bound as directed for fracture of the acromion.

Gunshot injuries of the scapula itself are not of a very serious nature. Balls make a clear passage through its broad plate, and the splinters occasioned by them are easily removed. Rest and simple dressings are all that is absolutely necessary for the injury of the bone, but the general treatment will depend on the further consequences of the wound that has involved the scapula.

FRACTURES OF THE CLAVICLE.

The clavicle may be broken at any part; but its middle, where the curve is greatest, is most frequently the situation of the injury. The fracture of this bone is ascertained by remarking that the shoulder is fallen lower and towards the breast; and on feeling along the bone, the crepitation of the broken ends is perceived: perhaps the broken ends are found to have passed each other. The outer extremity or scapular portion is found to be most depressed. One of the principal signs of fracture of the clavicle is the impossibility which the patient finds of applying the hand of the side affected to his forehead, or to touch the shoulder of the opposite side, for this motion twists the broken clavicle, and forces the broken ends into the cellular tissue.

Treatment.—The arm and shoulders of the patient are to be firmly drawn backwards by an assistant, when the fractured extremities of the bones immediately come in apposition. The parts are now to be covered with a piece of soap plaster, and a bandage is to be applied to retain them in their reduced situation. The single-headed roller of moderate breadth is applied by making it pass under the axilla of one side and over the shoulder of the opposite, describing on the back the figure of 8; it should be drawn with considerable tightness, and the arm should afterwards be supported with a sling.

M. Boyer's Apparatus for the same.—It consists of a girdle of linen cloth, quilted, and six inches broad, which passes round the trunk on a level with the elbow. It is fixed on by three straps and as many buckles fastened to its extremities: at an equal distance from its extremities on each side are placed two buckles—that is, two anterior and two posterior to the arm. A bracelet of quilted linen cloth, five or six fingers broad, is placed on the lower part of the arm of the side affected, and laced on the outside of the arm. Four straps fixed to this bracelet—that is two behind and two before—correspond to the buckles on the outside of the girdle already described, and answer the purpose of drawing the lower part of the arm close to the trunk; the more so, as the straps, by being two before and two behind, prevent the arm from moving either backwards or forwards. A cushion must be applied under the arm.

The clavicle is sometimes implicated in tremendous gunshot wounds, which, from their inflammatory and sloughing disposition spreading to the thoracic viscera and to the shoulder-joint, have been productive of protracted tortures to the sufferer.—The immediate preservation of existence has, in the fortunate cases, certainly depended on the profuse loss of blood; and the antiphlogistic regimen, with the utmost simplicity of dressing, has perfected the recovery.

FRACTURES OF THE HUMERUS.

Fractures of the humerus may be transverse or oblique, simple or compound.

Fractures of the Neck of the Os Humeri.

A depression is observed at the superior extremity and external side of the arm; and if we embrace the head of the os humeri with the fingers and fix it, and then rotate the arm at the elbow, it will be found that the head of the bone does not obey the rotatory motion, as it is separated from the body of the humerus by the fracture, which is in this case external to the capsular ligament.

In fractures of the cervix humeri, the limb is slightly shortened and somewhat deformed; there is inability to raise the arm, though the underhand motion still remain; and if the arm be raised and rotated at the same time there is a crepitis, whilst if the arm be simply rotated there is very frequently none. In young persons, the epiphysis is sometimes separated from the shaft of the humerus. Fracture of the head of the humerus is occasionally met with, and arises for the most part from a violent force directly applied, or from a gunshot wound.

In fractures of the os humeri near the deltoid impression the nutrient artery of the bone may be lacerated and give rise to extensive ecchymosis.

Treatment of the Humerus when fractured at its Head or Neck.

The patient being seated on a chair, an assistant takes hold of the hand of the sound side and makes counter-extension; another assistant grasps the fore-arm of the injured limb, which is previously placed in a semiflexed position, and makes extension; while the fingers of the surgeon are employed in adjusting the fragments. The surgeon next takes a roller six or eight yards long, and commencing at the palm of the hand, carries it up the fore-arm and arm by circular and reversed turns as high as the shoulder; thence across the breast, around the shoulder and armpit of the sound side; then across the back to the injured shoulder, where it is held by an assistant until the surgeon places three strong splints, each two inches wide, and the length of the humerus, on the anterior, outer, and posterior parts of the arm; and then resuming the roller, which is made to descend towards the elbow, secure them firmly to the limb, taking especial care to cover their extremities with tow or lint to prevent inordinate pressure and excoriation. Having proceeded thus far, the surgeon takes a pad, the shape of a wedge, composed of pieces of old linen, four or five inches broad, three inches thick at the base, and in length equal to the humerus, and placing the small end of it in the axilla if the lower fragment should be drawn outwards, and vice versâ, lays it along the arm, and secures it to the body and shoulder by narrow strips attached to its corners and by pins; then taking another roller, somewhat longer than the one previously applied to the arm, and commencing at the armpit of the sound side, he carries it to the injured arm, and fastens it to the body and the pad. The pad, being fixed, serves the purpose of a fourth splint for the arm, while it affords support to the fractured portion, upon which a common splint can have very little purchase. It only remains to suspend the fore-arm, which is fixed upon the breast, in a sling, and to secure the different turns of the rollers by pins or stitches.

Fractures of the Middle Part of the Humerus.

The head of the bone being grasped with one hand and the elbow with the other, upon rotating the arm no motion will be communicated from the lower to the upper portion, and at the same time a crepitus will be distinguishable.

Treatment.—In this fracture, be careful to adapt a splint to the inside of the arm with such a pad as may fill the axilla, without encroaching too much on the head of the humerus, or in the least pushing it from its place; then a piece of pasteboard is to be moulded to the shoulder, and the spica bandage applied and continued in the form of a roller on the arm.

Whether pasteboard, leather, or metal splints are employed, they ought to be long enough to reach the full length of the fractured bone, or from the joint above to the joint immediately below the place of the fracture. At the same time that these splints very much contribute to secure the fragments against alteration, they press less than the short ones on the place of the fracture, where the inflammation and pain are greatest.

The elbow must not be supported; but, on the contrary, by supporting the wrist only, the weight of the arm counteracts the contraction of the muscles.

When the long bones break spontaneously, the cause is, in the majority of cases, to be found in a cachectic state of the system, such as that in syphilitic, scrofulous, scorbutic, and cancerous complaints.

Leveille mentions the case of a young boy, aged 11 years, in whom the humerus snapped while he was throwing a pebble.

In compound fracture of the humerus, if the shaft be broken into fragments, such portions as may be loose are to be removed; and if the bone protrude through the integuments, the wound must be enlarged, and the bone returned to its natural situation. The fractured extremities are then to be placed as exactly into their natural position as possible, by relaxing the muscles, and by using a small degree of extension if the fractured ends happen to overlap one another. The lips of the wound are to be brought in contact and secured with adhesive plaster, and the whole supported by means of bandages and splints.

Fractures above the Condyles of the Humerus.

The appearances presented are like those occurring from dislocation of the ulna and radius backwards; but, in fracture, all marks of dislocation are easily removed by extension, although they return again as soon as the extension is withheld; and by rotating the fore-arm upon the humerus, a distinct crepitus can be usually felt.

Treatment.—Bend the arm and draw it forward, so as to reduce the parts, and then apply a roller. The best splint for this case is one formed at right angles, the upper portion of it being placed behind the upper arm, and the lower under the fore-arm. The splints are to be fixed with straps, evaporating lotions used, and the arm kept in a bent position in a sling.

In some severe cases of gunshot wounds, where the ball lodges in the humerus, particularly about the condyles, by making deep and cautious incisions before great swelling of the soft part comes on, we may occasionally succeed in removing the metallic mass with a forceps or elevator, either unaltered or beat out into an irregularly angular shape. Sometimes it is so firmly fixed, that it can be removed only by sawing the bone with the crown of the trephine or other instrument. The accident is always highly serious; but it is possible, under circumstances of peculiarly good fortune, in a temperate subject of a sound constitution, to save the limb by the operation.

Fracture of the Internal Condyle.

The ulna projects backwards; the hand is turned toward the side during extension; and the crepitus, which can be felt upon bending and straightening the arm, points out the nature of the injury.

Treatment.—The same as directed for the fracture above the condyles.

Fracture of the External Condyle.

Swelling over the condyle; pain on pressure, or during flexion and extension of the arm; crepitus readily felt during the rotatory motions of the hand.

Treatment.—A roller should be placed around the joint, which should pass also above and below it; support the limb in the splint, having two portions at right angles; to this the upper and lower arm are to be well secured.

FRACTURES OF THE FORE-ARM.

The fore-arm is more frequently broken than the arm, because external force operates more directly upon it than the latter part, especially in falls on the hands, which are frequent accidents.

The existence of these fractures is easily ascertained from the history of the circumstance; from the pain, which is rendered more acute by moving the hand; from the impossibility of performing pronation or supination of the hand; and from the noise produced by the friction of the fractured surfaces, whenever these motions are attempted; finally, from the change in the form of the arm, the anterior and posterior sides of which appear tumefied by the protrusion of the muscles, which the broken bones have displaced from the interosseous interval, the other sides being depressed; and from the mobility of the broken portions, and change in the direction of the arm.—When these bones are fractured near their inferior extremities, the inflammatory swelling might render a diagnosis less clear, and cause the fracture to be mistaken for luxation of the hand. But the two cases may be distinguished by simply moving the hand; by which motion, if there be luxation without fracture, the styloid processes of the radius and ulna will not change their situation; but if a fracture do exist, these processes will follow the motion of the hand.

The limb of the sound side should not pass unregarded, for it will show whether any peculiarities existed in the original shape; and it is obvious that the fractured bone should be made as nearly to resemble the original shape as circumstances will admit. From omitting to attend to the shape of the sound limb, a surgeon has been known to fatigue himself, and give much pain to the patient, for many minutes in attempting to make an originally crooked fore-arm when fractured straight.

Treatment.—The fore-arm is bent to a right angle with the os humeri, and the hand placed in a position between pronation and supination. Being thus fixed, an assistant seizes the four fingers of the patient, and by pulling extends the fractured parts, whilst another assistant makes counter-extension by fixing the humerus with both hands. The surgeon then very readily adjusts the fragments. To dress the fracture, a roller is applied, commencing at the hand and extending a little above the elbow: two firm splints are to be next applied, compresses of linen, flannel, or tow being interposed to fill up the spaces between the splints and the arm: the roller being brought down over these splints, secures them in their situation: the thumb, being uppermost, may be left projecting out between the splints, as an indication that no rotatory motion has displaced the fragments. The splints used in dressing all fractures of the fore-arm should be long enough to extend from the elbow to the extremities of the fingers, and a little wider than the broadest part of the arm.

Or pasteboard splints, softened in hot water and padded with tow, may be applied one on each side of the arm. A friend of mine employs in fractures of the lower part of the fore-arm, where he anticipates a falling together of the bones so as to give too great a roundness of the arm, a roll of adhesive plaster so doubled that the adhesive side forms the outer surface of it; this is placed on the inner or palmar aspect of the fore-arm, directly on the integuments covering the interosseal space, so as to press the muscles between the bones. If this plaster pad be properly placed and secured by means of the common pads, splints, &c., the bones of the fore-arm will be kept at their natural distance from each other, and deformity of the limb prevented.

Compound Fracture of the Fore-Arm.

A compound fracture requires the confinement of the arm upon a pillow; and, instead of the roller, Scultets's bandage is to be applied. The wound is to be dressed in such a manner as to promote its speedy union. If it be small and not greatly contused, it may be allowed to scab, and dry lint is to be applied over it; if great laceration exist, a poultice will be found necessary.

FRACTURES OF THE RADIUS.

Pain on moving the hand, and inability to perform pronation and supination, together with deformity, crepitus, and particularly the yielding of the lower fragment when the upper part of the bone is kept steady, are sufficient to indicate with certainty the nature of the accident.

Treatment.—In the treatment, care must be taken to keep the hand between pronation and supination — that is, with the thumb upwards: the bent position of the elbow is essential to the comfort of the patient. Having reduced the ends of the fracture when they appear to be displaced, the soap plaster is to be applied, and over this a slack roller. Only two splints are necessary; one is to be placed along the inside, the other along the outside, of the fore-arm. The splints should not extend below the lowest point of the ulna, lest, by pressing the hand upward, the arch of the radius be deranged, by forcing the fragments too near the ulna. The inner splint should extend to about the last joint of the fingers, but not completely to the end of the nails.

Fractures of the lower End of the Radius mistaken for Dislocation of the Wrist.

The injury which so frequently happens from falling on the palm of the hand, and which is characterised by the prominence of the extremity of the ulna, and by the diameter of the wrist-joint being diminished transversely and increased antero-posteriorly, is not a dislocation either of the radio-ulnar or of the radio-tarsal articulation, but is, in truth, a fracture of the end of the radius.

Treatment.—Graduated compresses applied to within an inch of the wrist-joint.

FRACTURES OF THE ULNA.

Fracture of the ulna is much less frequent than that of the radius; but when it does occur, it is easily discovered by passing the hand along it, as it is superficial, and easily felt from the olecranon to the wrist.

Treatment.—In this case the assistant, who makes whatever little extension may be necessary, should incline the hand to the radial side of the fore-arm, while the surgeon pushes the flesh between the two bones, and applies the apparatus as directed in fracture of the radius.

When the ulna alone is fractured, the change of shape is almost as great as if both bones were broken.

FRACTURES OF THE OLECRANON.

A swelling takes place at the back of the elbow, which when pressed feels soft, and allows the fingers to sink in towards the joint: this is between the two extremities of the fractured bone. The detached portion is drawn upwards from the head of the ulna to the extent of from half an inch to two inches: it can be readily moved from side to side beneath the integuments, and becomes further separated from its former connection when the arm is bent. The patient can bend the arm with ease, but he cannot extend it without great difficulty, and the attempt gives him much pain; without exertion it remains semiflexed. No crepitus can be felt, and the rotatory motion of the radius upon the ulna is perfect. Considerable tumefaction from effusion of blood usually follows this accident.

A young man playing at tennis, while aiming to strike the ball fractured his olecranon.

Treatment.—Let the fore-arm be extended, yet not to the utmost stretch; then the triceps is to be pressed with a view to relax it, and the olecranon brought down to its place. Dossils of lint are then placed on the sides and above the olecranon, and over these a roller is put on the arm and fore-arm: a long splint must then be applied on it anteriorly, by which the flexion of the arm is prevented. This splint is fixed by the same bandage, rolled on downward from the shoulder to the wrist, and upward again, if the bandage be long enough. The oblique casts of the bandage, which cross one another on the articulation, forming a kind of figure of 8, ought to be nicely applied and drawn very tight, because, if but slightly braced, their action, which is oblique, will not be sufficient to confine the olecranon to its situation.

Compound Fracture of the Olecranon

Is an accident of the most grievous nature, on account of the great number of nerves which pass in the neighbourhood of the part; it should therefore be treated with the greatest care. The inflammatory symptoms are to be treated by copious and repeated bleedings; the arm is to be placed half bent on a pillow, and lightly dressed, and Scultets's bandage applied.

Fractures of the Coronoid Process of the Ulna.

The symptoms resemble dislocation of the humerus forward, or rather a dislocation of the fore-arm backward.

Treatment.—The fore-arm must be kept fixed at a right angle with the humerus for several weeks.

The tendency of the brachius internus to draw up the superior fragment, is counteracted in some measure by the pressure of the roller above the elbow.

FRACTURES OF THE CARPAL AND METACARPAL BONES, AND PHALANGES OF THE FINGERS.

Fractures of the Bones of the Carpus.

Their smallness and spongy texture do not admit of their being fractured, but by a cause which acts on them immediately; and, in fact, fractures of them are always occasioned either by gunshot wounds, or some very heavy body falling on the hand.

It is obvious that, in cases of this nature, more attention is to be paid to the state of the soft parts than to the fracture.

Treatment.—When an attempt is made to save the part, the chief indications are to extract splinters of bone, and prevent inflammation, abscesses, and mortification. The parts may at first be kept wet with a cold evaporating lotion: if there be any wound present, dress it lightly and superficially; but afterwards, as soon as all tendency to bleeding is over, emollient poultices over the dressings supersede the lotion.

It often happens that fractures of these bones render amputation at the articulation of the wrist necessary.

Fractures of the Bones of the Metacarpus.

These fractures are always the result of a force immediately applied. If the hand be forcibly pressed between two bodies, or if a heavy body fall on it, comminutive fracture will be the result, and almost always several of these bones are fractured at once.

Treatment.—The same kind of treatment is requisite as in the preceding cases. To preserve the bones in their natural situation, the palm of the hand is laid over a cushion or pad, accurately adapted to the hollow of the palm and fingers, and then a roller is to be brought down from the fore-arm over the hand and wrist, including the pad.

Fingers.

When the bones of the fingers are broken, they are to be neatly set with pieces of pasteboard moistened, over which a smaller roller of tape is to be applied. The hand is to be placed on a flat splint or finger-board, always keeping the hand, fore-arm, and elbow well supported in a sling.

FRACTURE OF THE PELVIS.

Fractures of the Sacrum.

Some powerful cause, such as the fall of a very heavy body, or the passage of a carriage wheel, on the convex side of the os sacrum, can alone fracture it: it may be also fractured by a fall on the same part from some great height. Fractures of the os sacrum are more dangerous than those of the ossa innominata, because, in addition to the great degree of contusion and laceration, there is almost always great damage done to the sacral nerves. Hence retention of urine, inability to retain it, involuntary discharges of the fæces, and paralysis of the lower extremities.

Treatment.—Pass the forefinger into the rectum, and, if possible, replace the fractured part. To prevent inflammation, copious bleeding should be practised, and, if necessary, repeated leeches to the vicinity of the sacrum, and the parts kept cool with water or the acetate of ammonia lotion, and rest in a horizontal posture.

Fractures of the Os Coccygis.

The accident is known by the movableness of the fragments, and the acute pain produced by walking or moving the thighs, the fragments being then disturbed by the action of the glutæi muscles, some of whose fibres are attached to them.

Treatment. — The only remedy is rest, and gentle pressure by means of a compress supported by a T bandage. It may be necessary to adopt the antiphlogistic regimen.

Fractures of the Ossa Innominata.

When a fracture occurs of the os innominatum, which extends through the acetabulum, the head of the os femoris is drawn upwards, and the trochanter major is turned a little forwards; thus the leg is somewhat shortened, and the knee and foot are a little inverted, resembling the appearances produced by a dislocation in the ischiatic notch. When the sacro-iliac junction is broken through, and the pubes and ischium are fractured, the limb is in a great degree shortened, but the position of the knee and foot is not altered.

Treatment. — The existence of the fracture being ascertained, the surgeon's first care will be to obviate the consequences of inflammation by copious and repeated blood-letting. If inflammation have already taken place, it must be combated by the same means; at the same time topical remedies are to be applied. The pelvis ought to be surrounded with a napkin folded in the shape of a bandage for the trunk; and in cases where the contusion is excessive, the bones splintered and loose, and the neighbouring parts disorganised, as it would be impossible for the patient to move or to go to stool without suffering the most excruciating pain, it will be necessary to pass a piece of strong girth-web under the pelvis, the corners of which, collected into one, are to be fastened to a pulley suspended from the top of the bed: by means of this pulley, the patient may raise himself with a very little effort.

FRACTURES OF THE THIGH.

Fracture of the Neck within the Capsular Ligament, unaccompanied with Laceration.

Notwithstanding the existence of a fracture of this description, the patient may be able to exert considerable power in the limb. He may be able to bend it upon the pelvis, or roll it inwards, immediately after the accident; not, however, without giving himself pain. There is but little or no shortening of the limb. The foot may or may not be able to elicit crepitus.

Treatment. — A pillow should be placed under the whole length of the limb, and a second rolled up and put transversely under the patient's knee, so as to keep the limb in an easy bent position. In a fortnight or three weeks he is allowed to sit upon a high chair, and in a few days after begins to take exercise upon crutches.

Fracture of the Neck within the Capsule, in which the Covering of the Bone is nearly or quite divided.

The retraction of the limb is usually from three quarters of an inch to an inch and a half; commonly, however, in the recent state of the injury, it is not more than an inch.

There is eversion of the foot, attended with great diminution of the powers of the limb; the patient, however, is still able to roll it inwards, so far as to bring the foot from its everted position high enough to place the limb in that state which may be called supine, or in which the ball of the great toe and the superior anterior spinous process of the ilium are in a straight line with the long axis of the body. He can also bend the limb a little upon the pelvis, but not without great pain when the fracture is in the recent state. The limb may be readily drawn down to its proper length; but as soon as the extension is discontinued, it becomes again retracted, and may be passively moved in every direction, yet not without producing pain. Crepitus is generally felt when the limb is drawn down, and then rotated while the head of the bone is fixed firmly in the acetabulum, by pressing upon it with the fingers over the front of the joint.

Desault states, that in fracture of the neck of the thigh-bone, the direction of the foot outwards is to that inwards, as eight to two.

Treatment.—The patient ought to be laid on his back, the thigh bent on the pelvis, and the leg on the thigh; moderate extension may now be used with much advantage, as the muscles which chiefly resist the adjustment of the two pieces are relaxed by the semi-flexed position of the limb. The upper, or outer, or displaced portion is thus easily reduced and brought in contact with the lower or inner fragment, in which situation the object of the surgeon is to retain it. This is accomplished by forming a double-inclined plane with several pillows rolled firmly upon themselves into the form of bolsters, placed one above the other, and secured together by stitching; and along this double plane we are to place another pillow lengthwise, extending from the hip to the heel. The leg and thigh are retained in their places by sheets rolled round the limb, after the manner of a cravat, and secured by their ends to the posts of the bed. During the first month the surgeon ought to raise the thigh a little almost every day, and gently to draw the limb downwards. When he has reason to believe that the consolidation is effected, the double plane should be gradually lowered, by removing the pillows one by one.

The length of time necessary to the solid knitting of fractured cervix femoris is from 70 to 140 days, during the whole of which period the apparatus must be applied.

Fracture of the Neck external to the Capsular Ligament.

In this accident the injured leg is a little shorter than the other, but the foot and toe on that side are everted. From the loss of support which the body of the thigh-bone sustains in consequence of the fracture, much pain is felt at the hip, and on the inner and upper part of the thigh, and the joint loses its usual roundness. It may be known by the crepitus which usually attends it upon slight motion, for it is rarely necessary to draw the limb down to distinguish the grating of one bone upon the other; and this happens from the less retraction of the limb.

Treatment of Fracture on the Outside of the Capsule.

The patient is to be placed on a mattress on his back, with the injured limb in a bent posture, supported on what is termed the double-inclined plane, composed of three boards; one below, which is to reach from the tuberosity of the ischium to the patient's heel, and the two others above have a joint in the middle, by which the knee may be raised or depressed; on the sides there are several pegs, which prevent any change in the position of the limb. When the limb has been placed over the machine in an easy bent position, a long splint, reaching above the trochanter major, is applied to the outer side of the thigh, and fastened to the pelvis with a strong leather strap, so as to press one portion of the bone towards the other; and the lower part of the splint is to be fixed with a strap around the knee, to prevent its position being moved. The limb must be kept as steady as possible for 70 or 100 days, at the end of which time the patient may leave his bed, if the attempt should not cause too much pain; but the splint is to be continued for 14 or 20 days longer.

Fractures of the Trochanter Major.

The limb is but little shortened, and sometimes its length is not altered; the foot is generally benumbed. The patient cannot turn himself without assistance, and any attempt to do so creates excessive pain. If the fracture be attended with a division of the soft parts immediately surrounding the bone, the trochanter becomes drawn up upon the dorsum of the ilium by the action of the gluteus medius and minimus muscles, and the nature of the accident is very readily ascertained. The foot is greatly everted, and the patient is unable to sit, on account of the violent pain produced by that position. The surgeon might elicit crepitus by holding the trochanter firmly in the hand, while an assistant rotates and moves the limb in different directions.

Treatment.—The limb is to be put in the extended posture upon a pillow, and evaporating lotions and leeches are to be used for the removal of the swelling and inflammation. When this object has been effected, a roller is applied around the knee, and a piece of stiff pasteboard, about sixteen inches long, and sufficiently wide to extend entirely under the joint, and to pass on each side of it so as to reach to the edge of the patella, is to be placed under the knee, and confined by a roller. When this is dry, it has exactly adapted itself to the form of the joint, and this form it afterwards retains so as best to confine the bones. In five weeks passive motion of the limb may be gently begun, which will prevent anchylosis.

Anchylosis of the hip, in which the formation of a new joint was accomplished by sawing through the great trochanter and part of the neck of the femur, afterwards extending the limb, and allowing the several parts to unite by ligament.

Operation.—The integuments and fascia being divided and raised, the muscles in contact with the bone, around part of the great trochanters, were carefully detached, and a passage thereby made just large enough to admit of the insinuation of my forefingers before and behind the bone, the tips of which now met around the lower part of the cervix of the femur, a little above its root. The saw was readily applied, and without any difficulty a separation of the bone was effected. The thigh was now released, and I immediately turned out the knee, extended the leg, and placed the limbs side by side; by a comparison of which, in reference to length, the unsound member betrayed a shortening of about half an inch. Not one blood-vessel required to be secured. Union by the first intention was not attempted; the lips of the wound were only supported by adhesive plaster and slight dressing. The patient was put to bed, and Desault's splints were applied to support the limb. — DR. BARTON.

Fracture in the Middle of the Thigh.

The presence of a fracture in this part is to be discovered by carefully feeling along the upper side of the bone, when a projecting point will generally be discovered; and if at the same time the joint be rotated, a crepitus and preternatural motion of the fractured part will be observable.

Treatment. — The bone being reduced to its usual position by extension of the limb, rags wetted with a cooling lotion, or a plaster of ceratum saponis, should be laid upon the part, and over this the eighteen-tailed bandage. Three broad splints should next be applied, one on each side of the thigh, and a third on the upper part, that on the outside being sufficiently long to reach from the hip to the knee; these being confined with tapes, the limb is to be laid over the cushions or mattresses thus supported on the frame.

Dr. Gibson has suggested a very ingenious method for treating fractures of the thigh-bones.

It consists in elevating each of the extremities upon an inclined plane extending from the ischium to the heel. Extension is kept up by securing each foot by gaiters to a foot-board well cushioned. Counter-extension is made by the weight of the body, or may be effected by fixing the pelvis to the lower end of the frame by means of a roller or straps.

Near this extremity an opening is left with a corresponding door, for the purpose of placing a vessel beneath the patient to receive the fæces or urine.

Second Method by the Same.—This consists in extending the patient's limbs upon a mattress, and confining both feet by gaiters or handkerchiefs to a foot-board, which is firmly supported by the ends of splints passed through mortises near its edges. These splints extend from the arm-pit, where they are padded like the head of a crutch, along each side of the body, thigh, and leg, beyond the foot, and being well stuffed on their inner surfaces to prevent irritation, are confined by six or eight broad tapes or bandages passed round the limbs, pelvis, chest, &c. &c.

The principle upon which extension and counter-extension are effected by this contrivance will instantly be understood.

The sound limb being extended, serves as a splint to the broken one. Counter-extension then is made upon the acetabulum of the sound side, and extension upon the ankle of the injured limb, which, so long as the two are kept upon the same level, cannot be shortened, provided rotation of the pelvis be prevented.

This purpose is answered by extending the splints to the arm-pits on each side, and not with a view, as might be supposed, of producing counter-extension from these points.

When both thighs are broken, or when one thigh is fractured in several parts, no plan of treatment is comparable with that by permanent extension.

Fractures of the lower Extremity of the Os Femoris.

The fracture in which the condyles are thus separated from the os femoris, may be known by a perceptible separation increasing the width of the knee. The patella sinking into the chasm between the condyles, renders the part flatter than natural. If the patella be pressed backwards, the condyles are still further separated; if, on the contrary, pressure be made on the sides of the knee, the knee resumes its usual breadth and appearance; by moving the fragments crepitation may be heard. Where only one condyle is detached, it can be felt moving under the fingers, and producing crepitus when rubbed against its fellow.

Treatment. — If a fracture exist an inch above the knee-joint, and this fracture be attended with a shortening of the limb, which will be the case if it be an oblique fracture; and if, in addition to this, a second fracture separates the condyles extending to the first, in this case permanent extension is to be applied as in fractures of the body of the thigh-bone. This will prevent the upper fracture from displacement; and in order to keep the condyles in contact at their fractured surfaces, a roller or bandage of strips must be applied, reaching from the ankle to the middle or upper part of the thigh, and applied pretty tight at the knee. If the upper fracture be transverse, no necessity exists for permanent extension, and therefore simple pasteboard splints may be applied, or the long splints, as in the preceding case, omitting to apply the extending force.

The lateral pressure is in these cases the chief indication; and to prevent the foot and leg from swelling, a roller should be applied from the foot to the knee. The usual antiphlogistic remedies are to be employed, if inflammation run high, and the apparatus must be kept on eight weeks before any motion is attempted.

Sometimes this accident is complicated with a lacerated wound, from the bone being forced through the skin, or from the cause of the accident penetrating to the cavity of the fracture and of the joint, thus producing a compound fracture, with an exposure of the joint: a terrible accident, attended with all the dangers resulting from lacerated wounds of the larger joints, and demanding the same mode of treatment, with the additional measures necessary for maintaining in contact the fragments of the bone. —Compound fractures of the body of the os femoris require no difference of treatment from other compound fractures; but the dressings necessary for the external wound may be very conveniently applied without interfering with the long splints.

FRACTURES OF THE PATELLA.

The patella may be fractured in two directions, longitudinally and transversely.

Transverse Fractures.

When fractured transversely, the superior portion of bone is separated from the inferior, being drawn up by the action of the rectus, vasti, and cruræus muscles, which are inserted into it. The lower portion of the bone remains in its natural situation, connected to the ligamentum patellæ. Nothing can be easier than the diagnosis of fractures of the patella. If this bone be fractured transversely by a forced extension of the leg, the patient falls, and remains without the power of rising; the fall may instantly succeed the fracture, or there may be some interval. The impossibility of rising exists also when the fracture is effected by a fall on the knee. If raised by the aid of others, the patient falls again, if he attempt to advance; he can, however, move backward, by drawing the soles of his feet along on the ground, and by taking care not to bend the knee. There are several cases of simultaneous fractures on record of the patella from muscular action.

Treatment.—The chief obstacle to be encountered is the action of the extensor muscles, and this is easily overcome by the application of a stiff splint behind the limb, secured by a roller,—a piece of wood half an inch thick, two or three inches wide, and long enough to extend from the buttock to the heel; near the middle of this splint two bands of strong calico, a yard long, are nailed, at a distance of six inches from each other. Upon this splint, covered with compresses of soft flannel or linen, so as to fill up the irregularities of the limb, the patient's leg and thigh are placed.

An assistant now raises the heel, and the surgeon applies a common bandage, two inches wide and eight or ten yards long, commencing at the ankle, and proceeding to the knee; he carefully draws down the upper fragment of the bone as nearly as possible to the lower one, and places a compress of folded linen above it. Several turns of the bandage are now made over this compress, and obliquely under the knee, in such a manner as to cross below the lower and above the upper fragment alternately, in the form of the figure 8; the bandage is then carried on to the top of the thigh, and brought down over the splint, leaving the band attached to it free. Care must be taken to cover every part of the skin with the roller, because any part which is not thus supported will swell and inflame. After the dressing has proceeded thus far, the calico bands are to be used for the purpose of more completely fixing the fragments; the lower one is to be passed round the thigh, above the upper fragment, and, *vice versâ*, the upper strap passed below the lower, and secured by a pin or knot. These bands will thus enable the surgeon to exert any requisite compression upon the fragments, without the inconvenience of moving the bandage or splint. Confinement five or six weeks for an adult, and six at least, if advanced in years.

The bones most commonly fractured by mere muscular force are the patella, os calcis, and the olecranon of the ulna. A person with a heavy load on his back stumbles forwards; he attempts to recover his equilibrium; and during the effort, the violent action of the extensors of the knee causes the patella to snap.

Longitudinal Fracture of the Patella.

When the fracture is longitudinal, none of these symptoms exist, because the fragments still retain their position, or at least can only be made to separate from each other laterally, or in the direction of the breadth of the knee.

Treatment.—In longitudinal fracture of the patella the bones are easily replaced; and if after all the symptoms of inflammation are removed, we find that there is any occasion for a bandage, we may very easily retain the bones by adhesive straps drawn across the joint, which will not only bring the bones into contact with each other, but retain them in their places with the greatest ease.

FRACTURES OF THE LEG.

Change of direction and shape of the limb, pain and incapability of motion, mobility of the fractured pieces, and crepitation always distinct, &c.; all the circumstances render this fracture so evident that it is impossible to be mistaken as to its existence.

Treatment.—In the fracture of both tibia and fibula the knee should be moderately bent, the thigh, body, and leg being in the same position as in the broken thigh. If common splints be used, one should be placed underneath the leg, extending from above the knee to below the ankle, the foot being properly supported by pillows, bolsters, &c.; another splint of the same length should be placed on the upper side, comprehending both joints in the same manner; which disposition of splints ought always to be observed, as to their length, if the leg be laid extended in the common way, only changing the nominal position of them as the posture of the leg is changed, and calling what is inferior in one case exterior in the other, and what is superior in one, in the other inferior. Soap plaster and the eighteen-tailed bandage are generally used in fractures of the leg, prior to the application of the splints.

The many-tailed bandage is preferable to the circular; it enables us to examine the limb whilst it rests upon the splint or pillow.

Dr. Hutchinson's apparatus for keeping up extension and counter-extension will be found very convenient when the bones pass each other, and the limb is shortened.

It consists of two firm splints, long enough to extend from the knee several inches beyond the foot. The upper end of each splint has four small holes in it for the passage of tapes, and the lower a mortise, intended to receive a bar eight inches long. The bandage of Scultetus being applied, and the leg laid on a pillow, two tapes are placed on each side of the leg, and parallel with it, immediately below the knee, and are secured by a roller passed several times around the limb. Through the holes in the splints the ends of these tapes are next passed, and tied on the outside. Around the ankle, in the form of the figure 8, a silk handkerchief is placed, and the ends secured to the bar, which is previously passed through the mortises at the lower ends of the splint. By the tapes and roller counter-extension is produced, and by the handkerchief extension.

Mr. J. Bell's Process. — The limb having lain on a pillow for eight or ten days, and the swelling being gone off, he lays an eighteen-tailed bandage, made of fine linen, upon the pillow, and laps the tails of the bandage gently round the limb; and the linen being old and worn makes the limb feel cool, soft, and pleasant. Next, over that, to increase the thickness, he laps the tails of an eighteen-tailed bandage, made of fine soft flannel, which, were it applied next the skin, might cause itching and heat. The limb being now softly padded, as it were, with those bandages, is to be laid on a long and firm pasteboard splint; another splint is to be laid above it. In each splint a hole is to be cut for the respective ankles to which they are applied, and the two splints, extending each of them beyond the knee and ankle, are to be bound very firmly with several tapes over the foot, ankle, calf of the leg, under the knee, and above her knee.

FRACTURE OF THE TIBIA.

The fingers are to be moved along the anterior side of the tibia, the slightest inequality in which may be easily perceived, on account of its being covered only by the skin, and the motion of the pieces may be observed by seizing the opposite ends of the bone and pushing them in contrary directions.

This motion, however, and the crepitation which should accompany it, are very distinct, on account of the fibula not allowing the fractured portions to be sufficiently moved on one another.

> The tibia of a soldier was fractured in consequence of being struck by a ball; upon examination after amputation, a longitudinal fracture was found extending from the lower third nearly up to the head of the tibia.

Treatment. — Cooling lotions and soap plaster will be proper, and over this the eighteen-tailed bandage. The splints to be applied are, first, one strong splint of wood and leather, or of tin, which is to reach from the outside of the knee to the side of the foot. It must be made to receive the upper and lower heads of the fibula, and hollowed to receive the prominent muscles of the outside of the leg. Another splint, shorter than the last, is to be adapted to the plane surface of the tibia, on the inside. This splint should be straight, and reach only to the head of the tibia. The cure is performed in 40 or 50 days.

FRACTURES OF THE TUBERCLES OF THE TIBIA, WITH LACERATION OF THE LIGAMENTUM PATELLÆ.

Diagnostic Marks. — The tubercle of the tibia is moveable, and affords a distinct crepitus, the projecting body being far below the natural situation of the inferior part of the patella, as compared with the opposite tubercle of the tibia, and the lower part of the patella not having the abrupt surface of a fracture.

Treatment — similar to that recommended in fracture of the knee-pan.

Mr. Liston advises (in fractures of the upper end of the shaft of the tibia) that a hollowed splint of wood, extending from the middle of the thigh to near the heel, be applied behind, whilst one of pasteboard is placed on each side, and that all be secured by bandaging; the foot and lower part of the limb being rolled previously, to prevent infiltration. By this simple apparatus motion of the knee-joint and of the ends of the bones on each other is completely prevented. The heel is raised, if necessary, for complete adaptation.

FRACTURES OF THE FIBULA.

These fractures, which are not usually attended with deformity, and in some cases even do not hinder the patient from bearing upon the foot, cannot, for the most part, be ascertained, unless attention be paid to the manner in which the accident was produced, and to the presence of ecchymosis, and of more or less pain in the part which has been struck or pressed upon, together with a degree of irregularity of the fibula perceptible by the fingers, and a more or less distinct moveableness and crepitus of the ends of the fracture.

In order to distinguish this fracture, and avoid being imposed upon by a simple contusion, we must recollect that the anterior surface of this bone, having become external, is naked under the skin, until about three inches above the external malleolus, as far as the point where the peroneus brevis inclines backwards, and that the skin being more adherent here than behind, before, and above, a depression of greater or less depth results, when a tumefaction supervenes in the outer and inferior part of the leg, in consequence of a fall, a blow, or any other violence capable of fracturing the fibula, whether this fracture exists or not.

Treatment. — A splint, which will reach from the knee along the outside of the foot, is prepared; in the hollow of the splint soft lint is placed, so that it equally supports the limb. An eighteen-tailed bandage is put under the splint, and this apparatus is so placed on the mattress, that when the patient's leg is laid upon it, it rests on the outside of the leg and foot. Having laid down the leg on the splint, we examine again the degree of prominence of the inner ankle, and see that there is no twist or obliquity of the foot. We are careful to notice that the lower head of the fibula and the side of the foot are neither allowed to hang over the end of the splint, nor too much pressed up: the bandage is then applied. To be kept at rest for 30 or 40 days.

Fractures of the inferior Extremity of the Fibula and Dislocation of the Foot.

A cracking noise heard at the time of the accident, fixed pain in the lower extremity of the fibula, difficulty or impossibility of walking, swelling around the joint, and particularly around the lower ankle. An unnatural mobility of any point of the lower extremity of the fibula, crepitation on motion, the case in which the fibula can be pressed against the tibia, the mobility of the foot in a transverse direction, the change in the point of incidence of the axis of the leg on the foot, the displacement of the foot inwards, outwards, or backwards, rotation on its axis from within outwards, an angular depression at the external and inferior part of the leg, prominence of the inner ankle; the disappearance almost of these marks as soon as the reduction of the foot is attempted, and their immediate return when such efforts are suspended, and especially when the limb is placed in an extended position.

The crepitation will be easily distinguished by applying the stethoscope upon the fracture.

Treatment.—By bending the leg on the thigh, and diverting the attention of the patient, the resistance of the muscles is immediately overcome, and almost without effort the parts resume their natural position.

The apparatus for maintaining the fractured fibula complicated with luxation inwards, consists of a pad, a splint, and two bandages. The pad is made of linen and filled two thirds with the chaff of oats; it should be two feet and a half in length, four or five inches in breadth, and three or four inches in thickness. The splint should be from eighteen to twenty inches in length, two inches and a half in breadth, and three or four lines in thickness, of firm and but slightly flexible wood. The two bandages made of partly worn linen should be four or five ells in length. The pad, doubled like a wedge, is applied to the inner side of the fractured limb, extended upon the tibia, its base resting on the internal malleolus without passing it, and its apex on the inner condyle of the tibia. The splint applied along the pad should pass five or six inches below it, and three or four inches below the inner border of the foot. The splint and pad are then fixed to the superior part of the leg by some turns of the bandage passed from above downwards. In this state a space equal to the thickness of the pad, that is, from four to five inches, is left between the splint and the foot: this extremity of the splint serves as a point d'appui to bring the foot from without inwards. For this purpose the end of a second roller is fixed to the splint, and is applied successively over the superior surface of the foot, over its external border, under the sole, over the splint, then upon the instep, and under the heel, to return again over the splint, and to be continued in the same manner until the whole length of the roller is used. By this means the foot is placed in such a state of adduction that its external border becomes inferior; its sole is directed inwards and its internal border upwards. In luxation outwards and upwards, the splint, &c. must be placed along the fibula instead of the tibia.

In dislocation backwards, besides the former apparatus, a small cushion some inches square, filled with hair or oat-chaff, is employed. The large pad folded as a wedge is placed on the posterior part of the leg, extending from the heel to the hollow of the ham, its base inferiorly and its apex superiorly. The splint is applied on this pad, and is fixed to the upper part of the leg by one roller; a second bandage embraces the lower extremity of the splint and the leg, and is the really acting part of the apparatus. The small pad is placed on the tibia to preserve it from the compression of the turns of the bandage, which bearing on the splint and tibia carry at the same time the heel forwards and the tibia backwards.

In those complicated cases where the foot is dislocated inwards and backwards, the treatment must be adapted to the displacement which is most predominant.

FRACTURES OF THE BONES OF THE FOOT.

Os calcis. — The existence of this fracture is discovered by the circumstances of the case, — a fall on the sole of the foot, a crack heard in the moment of the fall, pain which is increased by the motion of the part, the absolute impossibility of standing or walking, a greater or less swelling of the heel, the mobility and elevation of that part of the os calcis into which the tendo Achillis is inserted; finally, the crepitation and interval between the fractured portions.

Treatment. — The end of the bandage is placed on the superior surface of the foot where the bandage is reverted on the sole, and the end is made fast by circular casts round the foot; this bandage is then drawn along the posterior side of the leg to the ham (the foot being previously extended), on which part it is fixed by other circular casts. It is thence brought downward forcibly, and the application of it terminated by rolling along the leg what remains. The other bones of the tarsus, as well as the metatarsus and phalanges of the toes, are susceptible only of comminutive fracture. They require the same plan of treatment as adopted for fractures of the bones of the hand. Union is effected in 30 or 40 days.

PARTIAL FRACTURES OF THE LONG BONES IN CHILDREN.

Diagnostic Symptoms. — Pain and a bent state of the bone injured, without absolute shortening of the limb; on the contrary, it is lengthened on the side to which the ends of the fractured part of the bone project.

Treatment.—The first indication in the treatment is to strengthen the bent bone; to effect this much care and delicacy of manipulation are required. The part of the bone which was merely bent may be broken, and the fracture rendered a complete one, the difficulty of treating which, without deformity, will obviously be greater in a child than in a person who can understand the necessity of submitting to restraint. The next indication is to prevent the recurrence of the deformity, and to keep the fractured surfaces in contact until they become united by callus; and this is to be fulfilled by the judicious use of splints and bandages, as in ordinary fractures.

NON-UNION OF FRACTURES.

It is evident that if the slightest degree of motion be allowed between the broken extremities of the bone, an ossific union cannot take place. Finding that the degree of reparation that she wishes cannot be made, nature sets about procuring a flexible union. The ends of the bones become smoothed over, the ragged particles are absorbed, and the motion allowed between the bones, perhaps, assists in this smoothing process. There is a sort of joint formed, and the union is effected by ligaments.

Sometimes, however, bones will not unite, although you may keep the broken surfaces in perfect opposition and preclude the least degree of motion.

The Operation for Non-union of Fractures.

It is necessary to have a needle strong and round, and with a point calculated to make way through a portion of bone: a common seton needle might be broken in the attempt to pass it.

The situation of the principal vessels and nerves must be well determined, and the track of the seton calculated to avoid them. An assistant draws and stretches the limb, while another sustains it and makes counter-extension. This, by separating the ends of the bones, gives more room to pass the needle through the elastic substance which is betwixt them.

When the seton is passed, the wounds may be bound up without any regard to position or restraint for three weeks, but at that time the splints ought to be put on and the motions restrained as for a recent fracture. The first symptom of amendment is a painful stiffness in attempting to bend the limb.

Dr. Somme's Mode of operating on the Thigh. — In this case the left femur was broken obliquely about the middle, and the fractured extremities rode over each other, the lower inwards and the upper end outwards.

The patient being placed on his back and supported, a long trocar and canula were passed, at first downwards on the inside of the upper fragment, and made to pierce the skin behind and a little to the outside. The trocar was then withdrawn, and a silver wire passed through the canula and out at the posterior opening. The canula was then withdrawn, and being replaced on the trocar, they were introduced again above and on the outside of the lower fragment, and made to pass out at the same opening behind. The trocar having been removed, the other end of the wire was passed through the canula, so that both ends were in contact behind, leaving a loop in front. An incision was then made in front from one orifice to the other made by the trocar, and the extremities of the wire were drawn through the wound, which brought the loop between the fractured ends of the bone. The edges of the skin were brought together by means of sticking plaster.

CLUB FEET.

For an infant, take a strip of adhesive plaster an inch broad and nine inches long, place one end of it on the outside of the foot, carry the plaster over the middle of the instep and down under the foot, so that it shall cover the end which lies on the outer edge of the foot; then twist the foot strongly, so as to turn the sole outwards instead of inwards, and secure it in that position by carrying the plaster round the inner ankle to the outside of the foot. This plaster must be changed every day, and be further kept in its place by means of a roller; at night it is necessary to put both on the inside and outside of the leg and foot a strong splint of pasteboard like a leg for drying a stocking on, shaped at the bottom to the foot, and reaching up to the knee.

These splints are to be removed every morning.

REMOVAL OF LOOSE SUBSTANCES FROM THE KNEE-JOINT.

The limb being firmly secured by an assistant, and the foreign body distinctly felt, the surgeon should push it to the upper and outer side of the joint with his fingers, after an assistant has drawn the skin tightly over it towards one side; the foreign body being fixed by means of a ring of a large key, held in the left hand, and firmly pressed against the side of the outer condyle. The surgeon with a scalpel makes an incision through the integuments and capsular ligament within the ring directly upon the substance, from above downwards into the joint, of such a size as will admit of its being easily removed, either with the finger, hook, or probe. If any attachments take place, these may be removed by a pair of probe-pointed scissors, the body being held firmly in the mean time by a pair of forceps armed with sharp crooked claws at the point; the same mode of extraction is to be pursued when more bodies than one appear.

After the concretion is removed, the lips of the wound are to be brought together by adhesive plaster. Bandage and splints are applied to the knee, to prevent its being bent, for a few days.

A strict antiphlogistic treatment must be enforced after wounds of the capular ligament of the knee-joint.

THE RUPTURED TENDO ACHILLIS.

The chief thing necessary in this case is to extend the foot and suspend the heel, which may be effected by means of a slipper, made of double quilted ticking and a strap of leather or riband, reaching from the heel to a circular piece or garter above the calf of the leg. In every case of ruptured tendon care should be taken not to put the injured part upon the stretch before union is perfectly consolidated.

ABSCESS OF THE HIP-JOINT.

This complaint is most frequent with children. Characteristic marks are — uneasiness, stiffness, and diminished ability to walk. Even after the disease has progressed some time, and an evident weakness is observed in the limb by its being favoured at the expense of the other; — when pain is felt from motion, and there is a disposition to fall from slighter causes than usual, and even when the points of the toes look more inward or outward than natural, the true nature of the disease is not suspected, as there is no fixed pain in the hip-joint, not even upon pretty hard pressure. If the two limbs be compared, even before the disease has proceeded far, the diseased one will be found rather longer than the other. After a while the natural convexity of the hip is lost, and when the patient walks it is found that the greater part of the weight of the body is sustained by the sound limb, and a limping commences. This is the commencement of inflammation of the hip-joint, and if it be not controlled in due time it runs on to suppuration. An abscess forms, which opens and gives vent to an unhealthy pus. The bones at the bottom of the abscess but too frequently become carious.

Treatment. — The child must abstain from all animal food or broths; he must be laid prostrate upon his bed or mattress, and this without exercising the limb at all, or as little as possible; he must be bled freely from the arm, if the pulse be active, or leeched upon the hip if the bleeding be not indicated. These must be repeated in proportion to pain or fever, if either come on. The bowels must be purged daily, or every other day, by the exhibition of cream of tartar and jalap, in doses suited to the age of the patient, and this persevered in until amendment is obvious or the cure completed.

CARIES.

Deep-seated pain and swelling in the affected part; softening of the bone; discharge of a fetid, blackish matter, and a luxuriant growth of fungus flesh, which is exceedingly vascular, and bleeds whenever it is touched.

Every bone in the body is occasionally affected with this disease; the spongy bones, however, more frequently than the rest.

Treatment.—When caries depends upon syphilitic, scrofulous, or scorbutic taint, or upon any constitutional disorder, general remedies must be resorted to. When it arises from local injury, the chief indications in the cure are to combat inflammation, to keep the parts perfectly at rest, and to remove any diseased portions of bone, as soon as they become loose. The second indication is a very important one, and will be most effectually accomplished by the use of splints adapted to the shape of the diseased part.

CARIES OF THE SPINE.

The patient complains of a numbness, or uneasy sensation in his lower extremities, is languid, soon tired by exercise, and very apt to trip or stumble in walking. While seated, his legs are usually drawn up under the chair, and crossed. Generally there is flatulence, sickness at the stomach, headache, derangement of the digestive organs, and a peculiar tightness at the scrobiculus cordis. After these symptoms have continued a few weeks or months, the lower extremities become completely paralysed, and the patient is unable to leave his bed. More or less protuberance may then be observed at some particular portion of the spinal column.

ABSORPTION OF THE INTERVERTEBRAL CARTILAGE.

The anterior portions of some of the intervertebral cartilages, in elderly people, often become absorbed, and occasion the bodies of the vertebræ at this part of the column to approximate and even to anchylose, by which the spinal pyramid is permanently bent forwards, and forms an outward curvature.

Solicitors and other persons who sit long over their desks, in the attitude of writing, are most subject to curvature from this cause. In curvatures without caries the patients generally retain a disposition to sit up and walk about; in those with caries, exercise frequently occasions pain, uneasiness, and speedy exhaustion of muscular power.

Treatment. — If called in the very commencement of the disease, the surgeon may perhaps impart benefit from leeches and blisters; these are seldom so efficacious, however, as issues or setons. Caustic issues, in particular, when made on each side of the spine, and in the immediate vicinity of the diseased vertebræ, will always be found highly beneficial, and indeed are more to be relied on than any other remedies; but in many instances it will be necessary to continue them for months or years.

To make an Issue. — First lay upon the part a piece of adhesive plaster, having in its centre a hole of the size and form of the intended issue, half an inch in diameter, which is placed opposite the spot in the integuments where the issue is to be: this hole is to be filled up with paste caustic, and covered with another piece of adhesive plaster larger than the former. A small compress and a few turns of a bandage constitute the requisite dressings.

Sir C. Bell prefers the making of issues with the caustic of a longitudinal form by the side of the curve of the spine, first on one side; and when the consequent inflammation is contract-ing, and the ulcer likely to become stationary, he makes another in the other side of the spine; for a time neglecting the first, and afterwards keeping up a considerable degree of irritation in one or other of the issues. Irritation being, in his opinion, absolutely necessary to effect a cure.

Sir B. Brodie disapproves of the use of beans in issues: He says, rub the issue every two or three days with the potash, and keep up a moderate pressure with lint in the intervals. If the surface of the issue looks sloughy or inflamed, a poultice should always be applied, as such a condition of the superficial sore is sometimes productive of great irritation.

Pott recommends the issues to be kept open until the cure is complete; that is, until the patient recovers perfectly the use of his legs, or even for some time longer, and that it would be more prudent to heal only one of them first, keeping the other open for some time; that is, not only until the patient can walk, but until he can walk firmly, briskly, and without the assistance of a stick.

Besides this local treatment, geat attention must be paid to the patient's diet, and especial care taken to open the bowels two or three times a week by some mild laxative. To take off the weight of the head and the upper part of the body, and thereby to diminish the irritation about the diseased part, the recumbent position will be found the most effectual, but the patient should not be confined to a close room or kept constantly in bed; on the contrary, exercise in the open air, on a mattress laid on a small carriage or waggon, may be used, during favourable weather, to great advantage.

EXOSTOSIS.

If small, make a longitudinal incision through the centre of the integuments covering the tumour; but if large, make a semilunar incision on each side of it, thus ( ), so as to form two flaps of sufficient size to cover the wound after the removal of the diseased portion; the flaps are to be carefully dissected from the sides and base of the protuberance, and reflected and protected by a piece of cloth, and the fingers of an assistant during the operation of Hay's saw in dividing the tumour on a level with the surface of the bone.

The edges of the wound are to be brought in contact, and retained with adhesive plaster.

NECROSIS.

In some cases it becomes necessary to remove by a surgical operation the sequestrum; that is, when great irritation is experienced from the dead bone, and when it can be easily removed in consequence of its superficial or exposed situation.

Operation. — This operation varies so much in different cases that general rules only can be given for performing it. The first stage of it consists in laying bare the affected bone, and this should be done by cutting through the soft parts where they are thinnest, and where there is least danger of meeting with large blood-vessels, or other important parts. It is best to remove completely a portion of the integuments covering the bone, by means of two curved incisions, meeting at their extremities; a simple incision does not sufficiently expose the bone.

After laying bare the new bone, a perforation is to be made through it with a trephine, and by means of this the sequestrum contained in it can be readily examined, and if small can now be extracted. If this, however, cannot be done, the remainder of the operation consists in enlarging the opening by means of Hay's saw, until the dead bone can be removed.

In general, it is best to perforate the lower part of the new bone, because a smaller aperture at an extremity will be sufficient, than at the middle of the bone. Perhaps the operation may, in some cases, be facilitated by breaking with strong forceps the sequestrum, when it is found too large to be conveniently extracted.

After the dead bone is removed, the wound is to be dressed with dry lint, and treated as a common wound.

Plate 5

Fig 1

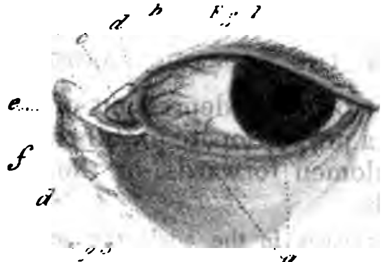


Fig 2

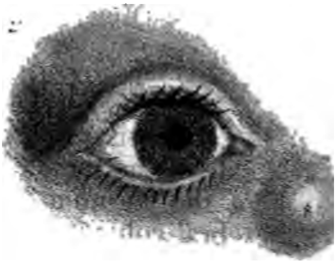


Fig 3

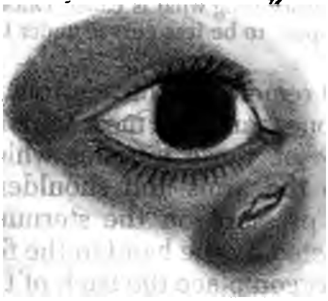


Fig 4

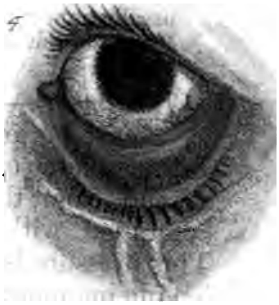


Fig 5

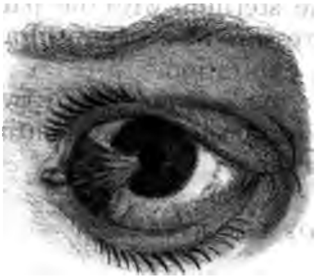


Fig 6

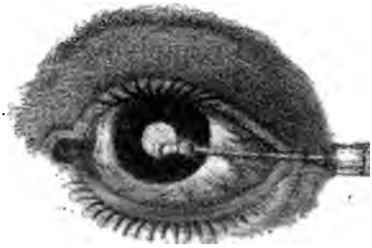


Fig 7

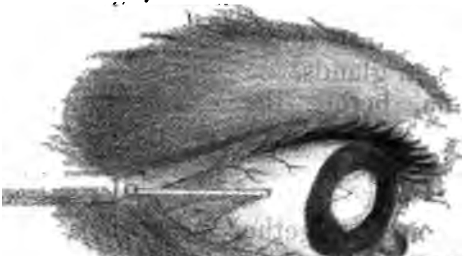


Fig 8

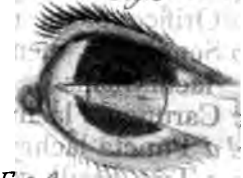
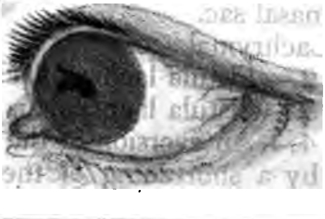


Fig 9



Schonberg lith. 163 Hatton Garden

W P Crooks del^t

LATERAL DEPRESSION OF THE THORACIC PARIETES.

It consists in a greater or lesser depression of one side of the thorax, with a proportionate protuberance of the sternum, the abdomen forwards, or the vertebral column backwards.

When this disposition persists in the adult the scapulæ usually project more behind, constituting what is called *chicken breast:* in this case the ribs appear to be less curved under the shoulders.

Treatment.—To general remedies, as bitters, tonics, &c., must be joined local ones, and the most important is exercise, especially of those muscles which extend from the chest to the arms and shoulders, combined with frequent pressure on the sternum. This pressure is better effected by the hand in the following manner: Let the surgeon place the back of the little patient against his knee, or against the wall, and then make pressure on the sternum with the palm of his hand, removing the pressure at every inspiration, and reapplying it at each expiration.

This pressure should be made from ten to twenty times a day, if possible, and should be continued for several minutes each time.

DISEASES OF THE EYES.

PLATE V.

Fig. 1.—The lachrymal sac and its ducts.
  a Orifices of the meibomian glands.
  b Semilunar membranula, before the caruncula lachrymalis.
  c Caruncula lachrymalis.
  d d Puncta lachrymalia.
  e e Two small canals, joined together near the nasal sac.
  f Lachrymal sac.
Fig. 2.—Fistula lachrymalis vera.
Fig. 3.—Fistula lachrymalis chronicus.
Fig. 4.—An eversion of the lower eyelid, occasioned by a shortening of the integuments, in conse-

quence of an extensive cicatrix formed a little below it.

Fig. 5.—A large pterygium, situated upon the eye-ball on the side next to the nose.

Fig. 6.—The mode of introducing the needle through the cornea (keratonyxis).

Fig. 7.—The mode of introducing the needle through the sclerotic coat into the body of the lens.

Fig. 8.—The method of passing the knife through the inferior half of the cornea, in extracting the lens.

Fig. 9.—An artificial pupil formed by the scissors, the opening in the cornea being marked by a line, the segment of a circle.

ADHESION OF THE EYELIDS.

Introduce a small probe-pointed bistoury into the inner canthus, and carry it forward the whole length of the adhesion, taking care to avoid the eye-ball or cutting into either of the lids.

WARTS ON THE EYELIDS.

When they have a long and slender root or stalk, cut them off with a pair of sharp scissors, or kill them by the application of a ligature. Should they possess a broad base, a few applications of lunar caustic will soon destroy them.

WARTS ON THE CONJUNCTIVA.

With a very fine pointed pair of dissecting forceps lay hold of the wart, draw it forward, and with a pair of scissors cut it off close to the conjunctiva.

HORDEOLUM.

With a lancet open the tumour, press out its contents, and pencil the interior of the cyst with lunar caustic. Small semi-transparent vesicles sometimes observed on the edges of the eyelids, are to be laid hold of with a pair of fine dissecting forceps, and snipped off with the scissors.

ENCYSTED TUMOURS OF THE EYELIDS.

The head of the patient being firmly fixed, the eyelid is to be everted, and held in this situation by the fore finger of the left hand; the surgeon makes an incision a little longer in extent than the tumour with a sharp-pointed knife. When the cartilage is divided the tumour appears, and a touch of the knife discloses its nature, whether fleshy, fluid, or otherwise.

If fluid, the contents escape, and the operation is completed by introducing the blunt end of a common probe into the sac, and moving it about in every direction, so as to empty it completely. If of a fleshy or steatomatous nature, it can by pressure be made to protrude, when it may be raised with a hook and cut off with a pair of scissors at its base.

When of a moderate size it is generally recommended to remove them from the inner side of the lid in order to avoid disfigurement of an external scar.

Tumours of the eyelids may be removed by a single stroke of the scissors, when they are small and their bases narrow.

EXTRANEOUS BODIES BETWEEN THE LIDS.

The patient is to be seated in a chair before a window; the surgeon takes hold of some of the centre eyelashes with the right hand, gently pulls upon them, and depresses the lid; then a probe or other instrument is placed transversely, and firmly held immediately above the tarsal cartilage. The cilia are then to be raised, and the lower margin of the lid turned over the probe, so as to evert the conjunctival surface. By this simple operation the extraneous matter generally comes into view, and can easily be removed; should it stick in the conjunctiva, it must be picked out with some sharp-pointed instrument.

EXTIRPATION OF THE LACHRYMAL GLAND.

Place the patient in a low chair, with the head resting against an assistant's breast, having previously covered the sound eye with a compress and bandage. Make an incision in the course of the orbicularis muscle with a common scalpel, cutting through its fibres and the superciliary ligament, dissect carefully around the tumour for a short distance, so as to loosen its superior attachments; after which it is safest, if possible, to accomplish its removal with the fingers or the handle of a scalpel.

OBSTRUCTION OF THE PUNCTA LACHRYMALIA.

The little finger applied to the cheek is to serve as a support, and by means of the fingers of the hand which does not hold the probe, the eyelid is to be drawn somewhat towards the temple, so as to be put on the stretch, and the edge of the eyelid to be brought a little forward, so as to bring the punctum into view. If the superior canal is to be examined, the operator introduces the point of Anel's probe, held like a writing pen, into the punctum from below upwards, till it reach the angle of the canal. He now turns the instrument in a circle till its point comes to be directed obliquely downwards and inwards; while, at the same time, he draws the eyelid somewhat upwards as well as outwards. If the inferior canal is to be examined, he introduces the point of the probe into the punctum from above downwards, and then lowers the handle of the instrument to a horizontal direction. If, upon continuing to press the probe onwards in the direction described, it enters the sac, so that he comes to touch the nasal side of that cavity with the point of the instrument, he may be assured that there is no obliteration of the canals.

The lachrymal sac is situated on the lower edge of the eye, about one eighth of an inch behind the ridge of the orbit.

Examination of the Nasal Duct.

A small common silver probe is to be introduced horizontally till it reaches the nasal side of the sac; it should then be raised into a vertical position, and its point directed downwards, and a little backwards. Turning the probe upon its axis, it is passed from the sac into the duct, continuing to press it gently downwards. If the duct be pervious, the instrument enters into the nose. If its point meet with some obstruction, it must not be immediately concluded that there is an obliteration of the duct, but continued to be pressed down a little more strongly, yet without violence, turning it round between the fingers, and giving it different directions. By these means the obstacle may frequently be overcome, and the probe will suddenly descend.

Another Method.

The probe is passed along the floor of the nostril, with its concavity directed towards the antrum, and its convexity looking towards the septum of the nose: carry it on in this course till its point has passed beyond the ascending plate of the jaw-bone, then rotate the probe between the thumb and fore finger till its point looks upwards and outwards towards the eye. While the probe is making this turn, it is of consequence that its point be maintained in close contact with the side of the nostril, and when the turn is completed, the handle of the probe is to be gently depressed, while its body and point are elevated. This motion conveys its point into the orifice of the nasal duct, and carries it up into the lachrymal sac.

Obstruction in the Nasal Duct.

Inject warm water into the nasal sac, through the lower punctum by means of Anel's syringe, at the same time placing a finger on the upper punctum, to keep the fluid from escaping. When this plan persisted in for several days does not avail, an attempt may be made to break the obstruction by passing Anel's probe.

If the obstruction in the nasal duct cannot be thus removed, a small puncture must be made in the sac, with a very narrow-pointed lancet. The blunt end of a smallish probe is next to be introduced into the punctum, and pushed down the sac and duct with sufficient force to overcome the obstruction in this canal, and pass into the nose. The probe is now withdrawn, and Ware's silver style passed down, and worn for a long time.

To be certain that the passage is clear, direct the patient to blow his nose, if pervious a bloody matter will be found on the handkerchief.

Another Method.

The surgeon having punctured the lachrymal sac with the point of a bistoury, inserted close below the tendon of the orbicularis palpebrarum, leaves the instrument there as a director till the canula is insinuated along it into the lachrymal canal: the bistoury is then withdrawn. Slight pressure is made upon the upper part of the canula, so as to imbed it in the canal, and the operation is completed.

The canula, which is of silver, gold, or platina, is one inch in length; its upper opening measures one tenth of an inch, the tube gradually tapering from its upper to its lower opening, the diameter of which measures one twentieth part of an inch. The lower opening is placed obliquely, and the upper one is surrounded by a small rim, to prevent it sinking too low into the duct.

Abscess of the lachrymal sac, terminating in fistulous openings through the integuments, is a disease of no uncommon occurrence in children, and is, for the most part, a scrofulous affection. It is unattended with stricture, and simply a strumous inflammation of the mucous membrane lining the sac furnishing a muco-purulent discharge. The principal object of the surgeon is to correct the state of the constitution.

PTERYGIUM.

The patient should be requested to lie upon a table or sit upon a chair, and having the eyelids well separated by an assistant, so as to expose the whole globe, which should be steadied by the firm pressure of the index and middle finger on each side, the operator siezes the pterygium with a pair of forceps elevated, and passes a cataract knife with its flat surface towards the globe under it; then carrying the knife horizontally forwards, shaves the thickened membrane from the cornea, and afterwards detaches its base, elevating the growth with the forceps, and cutting it away completely from its origin either with the knife or scissors.

ENCANTHUS.

When the encanthus is large and inveterate, with two extensive fleshy elongations, one on the inside of the upper eyelid, and the other on that of the lower, we are to proceed in the following manner: The patient being seated, an assistant is to turn out the inside of the upper eyelid, so as to make one of the appendages of the encanthus project outward. By means of a small bistoury a deep incision is next to be made into the elongation in the direction of the margin of the eyelid, and then, having taken hold of it, and drawn it forwards with a pair of forceps, it should be entirely separated from the internal surface of the upper eyelid longitudinally, proceeding from the external towards the internal angle of the eye as far as the body or middle portion of the encanthus. The lipomatose process, situate upon the internal surface of the lower eyelid, should be separated in the same manner.

The body of the encanthus should be afterwards elevated by means of the forceps; or, if this be not practicable, by a double hook, and then, partly by means of the small bistoury and partly by the curved scissors, completely detached from the subjacent conjunctiva which covers the eyeball from the semilunar fold and caruncula lachrymalis, penetrating more or less deeply into the substance of the latter, as the firmness and depth of the roots of the disease may render it necessary.

STAPHYLOMA OF THE CORNEA.

Pass a common cataract knife through the base of the tumour, dividing the lower half of the cornea first, and then turning the edge of the knife upwards; the superior portion should be cut through.

DROPSY OF THE EYE.

With a cataract knife make an incision at the lower part of the cornea two lines long, and at the distance of half a line from the sclerotica.

RELAXATION OF THE UPPER EYELID.

Pinch up a fold of skin near its centre, parallel with the edge of the tarsus, with a pair of forceps; and then, with one stroke of the curved scissors, cut it off. The edges of the wound are to be brought into contact, and kept so by means of adhesive plaster.

INVERSION OF THE EYELID.

The patient being seated in a chair, if an adult, or, if a child, laid on a table of convenient height, with the head raised and firmly held by an assistant placed behind, the surgeon turns out the hairs which irritate the eye with the point of a probe; then, with a pair of dissecting forceps, he raises a fold of the integuments of the affected eyelid, carefully providing that the part taken hold of correspond exactly to the middle of the space occupied by the trichiasis. This fold of the integuments is raised with the left hand, and in quantity more or less according to the degree of relaxation and inversion of the tarsus.

If the patient be an adult, when the fold of the skin has been raised to a certain extent, he should be desired to open the eye, and if, in this state, the tarsus and cilia resume their natural situation, the fold of the integuments will be sufficiently elevated for the purpose. In children we are under the necessity of doing it by guess. The surgeon, holding the fold of the integuments with his left hand by means of the forceps, should carefully include it in the crooked scissors, and being certain that one of the blades of the scissors is applied close upon the external margin of the tarsus, should remove it at one stroke. In uniting the wound, it will be sufficient to keep the supercilium depressed, if the operation have been performed upon the upper eyelid, or if upon the lower, to support it upon the inferior arch of the orbit, by pressing it from below upwards, to prevent the lips of the wound from separating, which should then be placed in perfect contact by means of strips of adhesive plaster, and secured by two small compresses and a bandage.

Second Method.

Let the eyelid be well turned outwards by an assistant; the operator then with a lancet divides the broad margin of the tarsus completely through by two perpendicular incisions, one on each side of the inverted hair or hairs. Let him then, by a transverse section of the conjunctiva of the eyelid, unite the extremities of the perpendicular incisions. The portion of the cartilage contained within the incisions can, if inverted with care, be then restored to its original situation, and retained there by small strips of adhesive plaster.

EVERSION OF THE LOWER EYELID.

Pierce the cartilage of the lid near the outer angle with a small hook, and pull it forwards, so as to put the lid on the stretch. The operator then, with a small probe-pointed scimitar-bladed knife, divides the lid perpendicularly for nearly a quarter of an inch.

A similar incision is made, in the same way, within an eighth of an inch of the punctum.

As soon as the bleeding ceases, pass through the skin, at the edge or margin of one side of the incision, and through the conjunctival edge of the other, a fine glover's needle, armed with a silk ligature, so that on drawing the ligature the conjunctival edge of one side may be brought in contact with the cutaneous edge of the other. The other incision, next to the punctum, should be treated in a similar way. If there be a considerable quantity of loose skin between the lower lid and cheek, an horizontal fold should be removed, as recommended for the cure of inversion.

EVERSION OF THE UPPER EYELID.

Pass a fine hook beneath the upper eyelid, and draw it forwards until its point shows through the skin at the distance of about a line from the external angle of the eye. An assistant, standing behind, draws up the skin of the eyelid to make it tense. The operator, with a pair of common straight scissors, clips away the ciliary margin of the eyelid from the angle to the punctum, including skin, cartilage, and roots of the eyelashes.

The incision is made sloping, commencing at the outer angle and terminating at the punctum.

EVACUATING THE AQUEOUS HUMOUR IN INFLAMMATION OF THE EYE.

The head of the patient is to be supported by an assistant, as directed for extracting the lens.

Introduce a small extracting knife into the cornea, so as to make an incision its own breadth at the usual place of making the incision for the extraction of the crystalline lens, and by turning the blade a little on its axis the aqueous humour flows out along its edges.

KERATONYXIS.

The pupil being dilated by the solution of belladonna, an assistant raises the upper eyelid with his fingers.

The extract of belladonna, moistened to the consistence of cream, is to be applied to the eyelids and eye-brow about two hours before the operation; and at the same time, a filtered solution of five grains of the same extract in a drachm of distilled water is to be dropped within the eyelids, while the patient lies on his back. About half an hour before proceeding to the operation these drops are to be repeated.

The operator lays hold of the needle, as in depression, with the thumb and two first fingers, the other two resting on the temple, nearly on the same level with the eye, as a steadying point for the hand; the handle of the needle is so far turned backwards as to lie over the ear of the patient.

The point of the needle, which is then situated in the outer angle of the eye, is directed towards the cornea, with its concave part towards it, the convexity towards the operator. In this position he seizes the favourable moment, when the eye is steady, to enter the cornea, at the distance of one eighth of an inch from its edge, and the needle passes without resistance through it, on pressing its point gently at the proper point, moving the end of the handle of the needle from behind forwards, so as to describe the fourth part of a circle. When the point of the needle has entered the anterior chamber, part of the aqueous humour flows along it; but the cornea does not consequently lose its convexity, the pupil merely contracts a little. The point of the needle is then to be directed against the cataract, through the dilated pupil, and the capsule is to be torn in every possible direction.

Dr. Beer advises three or four parallel incisions to be made through the anterior capsule, and these crossed again by as many more, so as to cut out a number of small parallelograms.

If the lens be milky, or of a fluid or soft consist-once, the contents of the capsule immediately flow out, mix with the aqueous humour, and render it muddy. The capsule now alone prevents vision; but after it is emptied it collapses, and, by a slight pressure on its upper part, may be easily depressed into the bottom of the posterior chamber. If the cataract be pappy, caseous, or crummy, it is to be broken down in its natural situation as much as possible, without injuring the iris.

The capsule is very tough, firm, compact, and elastic; its anterior portion being more so than its posterior, and requiring some force to lacerate it: this should be borne in mind by the operator.

CONGENITAL CATARACT.

The pupil being in a dilated state, from the application of a strong solution of belladonna within the eyelids about an hour previous to the operation, the child is to be laid upon its back on a table, with a pillow under its head and a folded sheet passed under the table and across the child's body, so as to confine its legs and arms; this should be held by two or three assistants, and kept as steady as possible.

An assistant should now hold the head, and, if the right eye is to be operated on, depress the lower lid while the upper is raised by means of the speculum, which the surgeon standing behind the head may hold in his left hand, while with the right he introduces the needle through the cornea, as near to its junction with the sclerotica as will admit the flat surface of it to pass in a direction parallel with and close to the iris, without injuring that membrane. He proceeds with a gentle lateral motion, working with the point and shoulders of the needle only, on the surface and centre of the capsule, in a circumference which does not exceed the natural size of the pupil. Having acted upon the centre of the anterior lamilla of the capsule to the extent which he wishes, he gently sinks the needle into the body of the lens, and moderately opens its texture;

the needle and speculum are now to be withdrawn. Should the cataract be in the left eye, we have but to change the position of the surgeon, and employ a steady assistant to hold the speculum.

Mr. Gibson says, I have always ordered an opiate, a few hours before the operation, sufficient to produce a considerable degree of drowsiness, so that the infant in general allows its eyelids to be opened and properly secured without resistance, and is little inclined to offer any impediment to the introduction of the couching needle; but, on the contrary, presents the sclerotica to view, naturally turning up the white of its eye. If the infant be more than a year old, or whenever it may be necessary, I introduce its body and arms into a kind of sack, open at both ends, furnished with strings to draw round the neck, and tie sufficiently tight round the legs, so that its hands are effectually secured, and the assistants have only to steady its body.

DEPRESSION OF THE CATARACT.

The patient being seated on a chair or stool rather lower than that occupied by the operator, and placed opposite a window which affords a good steady northern light, an assistant elevates the upper eyelid with his fore and middle fingers, at the same time supporting the head of the patient on his breast. The operator taking the needle in his right hand as he would a writing pen, with its convex side forward (if a curved one be used), or the flat side parallel to the iris if the spear-pointed be employed, thrusts it boldly through the sclerotica at the distance of a line and a half or two lines* behind the margin of the cornea, and nearly, but not exactly, in the middle of the eye, because the long ciliary artery runs on each side along the middle; therefore the needle should be entered a little above or below.

Prof. Beer introduces the needle with the one flat side directed upwards, and the other downwards, through the coats of the eye, at the eighth of an inch from the edge of the cornea, and at the twelfth of an inch below the transverse diameter of the eye. The point of the instrument is then directed towards the centre of the vitreous humour.

It is to be introduced on the temporal side of the globe, and then carried forwards and upwards, so as to place it on the upper and front part of the lens.

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* A line is the twelfth part of an inch.

Dr. Bowen recommends the introduction of the needle into the globe of the eye, through the sclerotica, three lines or three and a half from the transparent cornea, and a line below the transverse diameter of the pupil. The instrument passes into the vitreous humour posterior to the lens and its capsules. The point of the needle is then brought forwards, from inclining the hand to the temple, and penetrates the posterior capsule.

The surgeon turning the instrument around upon its axis, so that the flat surface, which before was applied to the front of the cataract, be now placed upon the superior edge, steadily presses it obliquely downwards and outwards, so as to conceal it beneath the pupil. For the space of a minute or two the needle is to be kept in contact with the depressed cataract. Its point is then to be gently raised, the operator taking notice whether the cataract re-ascends or remains depressed. If it re-ascend, the depression must be repeated.

RECLINATION OF THE CATARACT.

The operator rests the flat edge of the needle on its anterior surface, and raising the handle diagonally forwards, pushes the opaque lens into the bottom of the vitreous humour between the inferior and external straight muscles. In this position what was before the front surface of the cataract will become the upper one, the back the lower one; its upper edge will be turned backwards, its lower edge forwards.

Reclination through the Cornea.

The iris being reduced to a mere line through the influence of belladonna, the operator passes a needle through the cornea into the anterior chamber about a line from the lower edge of it, one of its flat sides being applied to the anterior surface of the cataract. This may be reclined completely below the axis of vision, without touching the pupillary edge of the iris, by merely elevating the handle of the instrument.

EXTRACTION OF THE LENS.

The patient being seated on a chair or stool rather lower than that occupied by the operator, and placed opposite, but at a short distance from, a window which affords a good northern light, the inner side of the eye towards the nose where the point of the knife is to be carried through should be well brightened. An assistant elevates the upper eyelid with his fore and middle fingers; at the same time he supports the head of the patient on his breast. The operator is in the same manner to depress the lower lid, permitting the fingers to project a little towards the ball of the eye. This being accomplished, with Beer's knife held as a pen, the cutting edge towards the palm, the elbow resting on the knee, the operator commences his first incision, by directing the point of the instrument obliquely towards the cornea* as if to penetrate the iris.

> Mr. Travers prefers making the section midway between the pupil and margin of the cornea; if it be higher than this, the lower margin of the pupil insinuates itself into the section, and the cicatrix not only disfigures the cornea in the greatest degree, but encroaches very disadvantageously upon the pupil.

When the cornea is fairly pierced, the knife is carried carefully and steadily forward in a parallel direction to the iris, and brought out in the same manner through the cornea on the opposite side. As soon as the point has penetrated the opposite side, the operator should rest a moment, until the spasmodic action of the eye which arises from the irritation has subsided. The incision is to be completed by pushing the knife slowly with an uninterrupted and steady motion forwards and downwards.

The cornea being cut, pass through the pupil a cataract needle, and detach with care the capsule from the lens. This done, the lens will generally protrude soon after through the pupil by the sole action of the eye.

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* One fourth of a line above its horizontal diameter.

Dr. Wenzel states, that no attempts should ever be made to fish out with the curette those portions of a scabrous lens which are apt to remain in the eye after the body of the lens has made its exit, and that no experiments ought to be made to ascertain the degree of vision of the eye which has just been operated on.

If upon waiting a few moments the surgeon should find that this reaction does not take place, or is too feeble to expel the lens, he is to assist its expulsion by pressing the globe of the eye gently over the upper eyelid with the arched curette.

If the cataract be of moderate consistence, the patient properly prepared for the operation, a favourable state of the weather selected, the patient steady, the eye carefully shaded for five days after the operation, the pupil dilated by belladonna, during all that time the body kept as much as possible at rest, and for some weeks all unnecessary experiments forborne, there can scarcely be a doubt of a favourable termination of the division of the cornea.

Mr. Ware has found that a dossil of lint steeped in plain water, or brandy and water, and covered with a spermaceti or saturnine cerate, and removed once every day, is the most easy and convenient dressing that can be applied after the operation.

SECTION OF THE CORNEA UPWARDS.

The incision must be made in a direction contrary to that which is generally employed in common cases of cataract.

In order to make the incision in this manner, the cutting edge of the knife must be turned upwards, and carried on in this direction with the same precaution as if it were intended to make the incision downwards, and with the same care, to defend the iris from being wounded.

The incision is made in this way with as much facility as in the former, and by employing it in particular cases much advantage may often be derived.

ARTIFICIAL PUPIL.

The eyelids being secured, a puncture is to be made in the cornea with a broad cornea-knife, within a line of the sclerotica, to the extent of about three lines.

All pressure is now to be removed from the eyeball, and the cornea-knife gradually withdrawn. The consequence of this is that a portion of the aqueous humour escapes, and the iris falls into contact with the opening in the cornea, closing it like a valve. A slight pressure must now be made upon the superior and nasal part of the eyelid with the fore and middle fingers of the left hand, till at length, by an occasional and gentle increase of pressure, or by varying its direction, the iris gradually protrudes, so as to present a bag of the size of a large pin's head.

This protruded portion is to be cut off with a pair of fine curved scissors, and all the pressure at the same time removed. The iris will then recede within the eye, and the portion of it which has been removed will leave an artificial pupil more or less circular.

Professor Beer makes an incision with a cataract knife close to the edge of the cornea, not larger than the third part of its circumference: the iris, if it protrudes, is laid hold of with the hook; or if no protrusion takes place, the hook, introduced by the wound, lays hold of the pupillary edge of the iris, which is then to be dragged out by the wound, and a sufficient portion of it cut away.

Previously to the performance of any operation for artificial pupil, we should always ascertain whether any improvement in vision may be obtained by the use of belladonna or stramonium. The dilation of the constricted pupil to the size of a small pin's head, or even less, will often give the patient a degree of vision which will render any operation unnecessary.

With the Needle.

The operator introduces a common cataract needle, cutting on both edges, through the cornea one line from the sclerotica; the point being carried in front of the iris, a perpendicular incision is to be made, extending nearly its whole length. A second transverse cut is made, dividing the former in its middle, and thus forming an incision with four angles, thus +.

With the Knife.

The patient being seated as in the operation for cataract, and the eye rendered steady, the artificial pupil knife should be introduced through the coats of the eye, about a line behind the iris, with its cutting edge turned backwards instead of downwards.

The point is next brought forward through the iris, somewhat more than a line from its temporal ciliary attachment, and cautiously carried through the anterior chamber, until it has nearly reached the inner edge of that membrane, when it should be almost withdrawn out of the eye, making a gentle pressure with the curved part of the cutting edge of the instrument against the iris in the line of its transverse diameter.

If in the first attempt the division of the fibres of the iris be not sufficiently extensive, the point of the knife is to be again carried forward and similarly withdrawn, until the incision is of a proper length, when the radiated fibres will immediately contract, and an opening of a large size be formed.

Autenrieth recommends a small triangular portion of the sclerotica to be excised close to the edge of the cornea just below the course of the ciliary vessels, and the exposed portion of choroid removed with a pair of scissors.

ARTIFICIAL EYES.

Having chosen one of sufficient size, hold it perpendicularly between the fingers and thumb, the most convex part upwards; it should slip easily under the upper lid, and then be introduced above the under and adjusted as to its position. This ought to be repeated frequently before its use is permanently commenced; by and by it may be permitted to remain in its situation for a short time, and the duration of this trial gradually increased until the part becomes accustomed to it. It is easily removed by depressing the lower lid, and just moving it with the point of a pin. The instrument always excites some irritation at first; this, however, is of advantage, as it causes the parts to become consolidated, and the artificial eye fits with more exactness. It is recommended in the first instance, to employ a large instrument, and afterwards to apply a smaller, so that it may move with each motion of the globe; a circumstance of absolute necessity to prevent any defect being observed. The artificial eye should be frequently removed and cleaned.

The artificial eye should be of the same form and dimensions with the sound one. It ought to imitate as near as possible the colour of the iris, the size of the pupil in its middle state of distension, the exact protuberance of the cornea, and the tint and hue of the sclerotic coat with the vessels which traverse it.

IMPERFORATE NOSTRILS.

When any opening exists in the obstructed nostril, it may be readily dilated by the introduction of a grooved staff, and then cutting upon it in the course of the adhesion; but when no passage appears, the operator must endeavour, by means of a fine-pointed scalpel, to discover one of the nostrils, and when found, enlarge it by a director and bistoury. The other nostril is to be treated in the same manner. After the openings are made, they may be preserved of a proper size by the introduction of dossils of oiled lint, which should be frequently cleaned or renewed. A portion of elastic catheter answers the purpose better, and allows the patient to breathe freely through it during the progress of the cure.

PLUGGING THE NASAL FOSSÆ.

Introduce a common bougie curved and nicked at the end, with a ligature attached, through the lower part of the nostril, till the point appears behind and below the soft palate: this will be facilitated by inclining the head backwards. Then, taking hold of the anterior half of the ligature, separate it from the end of the bougie; bring it out at the mouth, and withdraw the bougie from the nostril, making a sliding loop on the fold of the ligature, into which introduce the sponge; carry it behind the soft palate with the forceps. Then, removing the forceps, draw the ends of the ligature which have remained at the interior nostril, till the compress be fixed in its proper situation in the posterior aperture. The entrance of the sponge into the posterior aperture may be known by a slightly increased resistance; if properly adjusted, the cessation of the hæmorrhage is the immediate result. A small light compress may be placed at the anterior nostril, on which tie the ends of the ligature.

Another Method.

Tie a proper-sized dossil of lint to one end of a piece of strong sewing silk well waxed; then introduce a piece of catgut up the bleeding nostril, through to the back part of the fauces; draw that end out of the mouth, and tie a knot in it, to which fasten the other end of the waxed silk; then withdraw the catgut and silk by the nostril till the dossil is fixed in the back part of it; after which fill the anterior portion with lint.

Passing the Elastic Tube through the Nostril into the Stomach.

The patient being properly placed with the head inclined backwards, the surgeon passes the elastic tube, armed with wire like that of the ordinary catheter, into one of the nostrils: by turning its concavity downwards, he pushes the instrument on slowly until it reaches the middle of the pharynx. He then withdraws the wire with one hand, whilst, by an opposite motion with the other, he pushes the tube lower, and in such a manner as to make it penetrate into the superior extremity of the œsophagus, and even to fix it considerably forward in this canal.

If introduced into the larynx, it is ascertained by the painful tickling which the patient experiences, the sudden cough with which he is attacked, the desire to vomit, and the spasmodic agitation of the whole larynx, and by the vibrations of the flame of a candle when placed before the external opening of the tube. On the contrary, if it be introduced into the pharynx and œsophagus, there will be less irritation, the cough does not supervene, and the flame of a candle does not vacillate.

Broths or any nutritious food may be injected into the stomach through the elastic tube.

Method of removing Polypi or other Tumours from the Nose.

Having divided the ala with a knife or scissors as far as the margin of the nasal bones, the operator can see freely into the cavity of the nose, and readily apply his instruments to any point.

Should both nostrils be affected, he must not only divide the alæ, but also the columna and septum, and turn back the nose during the operation. The wounds are easily united by the twisted suture, and generally heal in a few days.

Application of the Ligature to Polypus of the Nose.

The patient must be seated in a well-lighted room, opposite to the window, with his head turned back, so that the operator may have a distinct view of the tumour. He is then cautiously to introduce a piece of silver wire or catgut, doubled, into the nose till the bend in the middle of it is got behind the tumour.

He then pushes it up over the basis of the tumour to the neck, and introduces the two ends of the wire or catgut into the double canula, which is to be inserted into the nostril, and the wire tightened firmly by pulling it close to the end of the canula, within the nose, and rolling it round the end of it without the nose, so as to keep it firm. The latter must be left in the nose, and in twenty-four hours the wire or catgut is to be tightened a second time.

When the tumour is large, and hangs back into the throat, and has largely connected itself with the ossa spongiosa, the double wire or catgut must be pushed gently through the nostril until it appears in the throat, after which the surgeon is to open the double wire so far that he can put it over the tumour with the forefinger of his left hand; when, keeping it in this situation with his right hand, he gently pulls the ends towards him, till, with the finger of his left hand still directing him, he becomes certain that the neck of the tumour is entirely surrounded.

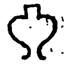
When this is done, the cord or wire must be passed through the double canula, which is to be pushed into the nostril and fixed as before, until the polypus drop off.

Second Method.—Case.—A large tumour was found projecting behind the soft palate as low as the extremity of the uvula, and completely filling the posterior nares and cavity of the nose. After vain attempts to extract it in the usual manner with ligatures and forceps, a piece of tape was made stiff by passing silver wire through it, and this was fixed on the projecting part of the tumour by a firm knot; the tape was now pulled forcibly, and with it came away the polypus, which was of prodigious size.

Polypus of the Nose removed by the Forceps.

The patient must be seated as for the ligature: the surgeon is then to introduce into the nose a pair of forceps with an opening at the end of each blade, the inside of which is flattened, and roughed like a file; having taken hold of the tumour as high up as possible, he turns them gently round, twisting off the tumour gradually from its root. When the polypus breaks off short from its roots, the attempt should be renewed, unless much hæmorrhage forbids, in which case wait for a better opportunity. Sometimes a profuse hæmorrhage immediately follows the separation, but the vessels soon retract; otherwise it may be stopped by dipping dossils of lint in some styptic, and passing the same up to the mouth of the vessel.

New Nose.

The patient being placed in a chair, with the head properly secured by an assistant, the operator, standing in front, commences by removing with a scalpel the callous edges surrounding the nasal chasm, and also a small square flap from the middle of the superior part of the upper lip, to which the new septum is to be fixed. A flap of this shape  is to be carefully dissected from the forehead, commencing from above and carrying downwards to the space between the eyebrows. This being accomplished, this neck of integument is to be carefully twisted, but not so as to endanger strangulation. The flap is next brought in contact and fitted to the raw edges of the opening, and retained by two or three ligatures on each side, and one at the septum. A small portion of a large-size elastic gum catheter is to be introduced, to keep the new-made nostrils open. A soft compress of lint is to be applied to the raw edges, wetted with rose or elder water, and retained by two or three small strips of gold-beater's skin.

The operator marks out the shape and size of the flap with ink: it varies from 2½ to 3½ inches long, to 2 in breadth.

Re-union succeeds best, not when the separated portions are immediately brought into contact, but, on the contrary, when five, ten, or fifteen minutes, or even an hour, is permitted to elapse before the divided parts are re-applied.

On improving the Form of the Sunken Nose by operating on the Cartilaginous Septum.

The patient is seated on a chair, with his head leaning on the breast of an assistant. The surgeon holds the columna with the thumb and forefinger of his left hand, drawing it still further to the side till the fold in the cartilaginous septum appears, which is then to be pierced with a small scalpel, and the whole partition in the interior of the nose is cut through, from the columna as far up as the nasal bones.

The point can be fairly raised, and immediately, by the fingers. To prevent too quick a re-union taking place, pressure must be applied to the sides of the nose, in order to force the point forward, and thus keep the edges of the divided partition considerably asunder, at least to the extent of several lines.

Compression consists merely in sqeezing the sides of the nose between a leaden plate about two inches long and one inch broad, which is to be bent and laid over the nose, and kept in this situation by means of a compress and bandage.

In three or four weeks the gap in the septum is generally filled up with granulations, and the point of the nose raised to its proper angle.

POLYPUS OF THE ANTRUM.

The surgeon separates, with a scalpel, the cheek from the maxillary bone, by opening the patient's mouth as widely as possible, and cutting through the internal membrane. The cavity may then be exposed by means of a small trephine; but this instrument is rarely required; the parietes being so softened as to yield easily to the knife, plyers or cutting forceps may be useful in enlarging the cavity. In some cases it is necessary to remove several of the molar teeth, and their alveolar processes, corresponding with the floor of the antrum. Having exposed the cavity of the antrum and the surface of the tumour, it is to be separated by a blunt-pointed bistoury, and a scoop is used to turn out the diseased mass. The root of the tumour is then touched with a red-hot iron, and by this instrument, or by dossils of lint or tow, the hæmorrhage is easily arrested.

Case of Extirpation of Fungus from the Antrum.—The second incisor and the last molar but one were first extracted.

The commissure of the lips being then drawn up by an assistant, the upper lip was dissected from the os maxillare superius to within a line of the infra-orbital foramen. The bone (superior maxillary) was then bored through in this point by a long trocar, the point of which was carried backwards and downwards until it perforated the palatine process of the left os maxillare superius. The palatine membrane was then incised from this point to the exterior edge of the first left incisor tooth. The palatine process of the os maxillare superius was divided by a fine narrow saw, passed, with the teeth directed downwards and forwards, through the route made by the trocar.

The soft parts covering the bone, both above and below, between the socket of the last molar tooth but one and the perforations made by the trocar, were next divided. It only remained to divide the bone. This was effected with great ease by a flexible, elastic saw, made of a clock spring, being about seven inches long, and having teeth only in the middle, to the extent of three inches. It was introduced through the former division of bone from below upwards; one extremity passing out of the mouth, the other out of the superior opening made by the trocar. The two extremities of this saw were then connected to handles, so that it was worked with both hands, one pushing and the other pulling alternately, so as to keep the saw bent laterally, with its convexity backward, until it completed the section of the bone in the direction of a curved line, extending from the point where the trocar first entered to the socket of the molar tooth extracted.

HARE-LIP.

The patient, if a child, should be secured upon a person's knee, or rather, perhaps, upon a table; but if an adult, he is to be seated upon a chair, in a proper light, with his head supported against the breast of an assistant.

The frænum, connecting the gums to the upper lip, is to be divided; if a tooth projects so much as to prevent the parts from being brought properly together, it is to be extracted; or if a small portion of the bone projects, it must be removed.

The surgeon, standing before and a little to the right of the patient, so that the hand of the side which is to act may correspond directly with the part affected, seizes and pinches, with the thumb and index of the other hand, the left border of the division, cuts from below upwards, and a little from without inwards, all the red part of this border, observing to hold the blades of the scissors always perpendicular to the lip, and to remove inferiorly a larger portion of flesh where it is necessary to take away all the rounded border, rather than superiorly, where it is sufficient to make that border raw. He seizes, between the fingers of the left hand, the right portion of the lip not upon the border itself, as in the opposite side, but a little beyond it. He draws it downwards, and with the scissors removes, by an oblique incision corresponding to the preceding, all the red border of that side.

The edges of the wound are to be brought into contact, and a nice apposition of the two sides for the whole extent made. In this state the pins are to be passed as directed in the twisted suture.

The pins are generally removed at the end of the fourth day from the operation.

To prevent secondary hæmorrhage, pass the pins completely behind the artery between it and the investing membrane of the lip, directly opposite, or nearly so, to the point where the vessel is seated.

With the Knife.

The callous edges of the fissure are to be pared off, first on one side by putting a piece of pasteboard, lead, or tin, under the lip, which is to be stretched out and held upon it with the surgeon's index finger and thumb, while with a scalpel in his other hand, he cuts off the requisite portion by an even, straight incision. The opposite portion of the lip is to be fixed in a similar manner, and have its callous margin completely pared off by another regular stroke of the knife.

DOUBLE HARELIP.

Pare the edges of that portion of skin which exists between the two fissures, in the same manner as in single hare-lip. In double hare-lip you must not operate on both sides the same day. Allow one side to get well before you operate on the other.

The fissure of the palatine arch varies in extent and in size; sometimes limited to the maxillary bones. It always unites after the operation, but frequently occupying the palate bones, it crosses the velum palati, and then examples of union are not so commonly observed.

CANCER OF THE LIP.

Place between the lip and the gums of the patient a piece of sole leather, three inches in length, and from one to two inches in breadth; upon this the lip is spread, and the operator makes an incision on each side of the tumour, quite through the sound part of the lip, in the shape of the letter V. The diseased mass being removed, the vessels are to be secured and the edges of the wound united by means of the twisted suture and uniting bandage.

Dupuytren instead of removing a triangular portion, and then uniting the cut surfaces by sutures, in some cases makes a semi-lunar incision so as to remove all the hardened part, and then covers the surface with simple dressing.

NEW LIP.

A piece of leather, of the size and shape of the under-lip, is placed under the chin, and a corresponding portion of the integuments is reflected upwards, a thick attachment being left at the symphysis menti. The callous margins of the space formerly occupied by the original lip are pared, and the flap, having been twisted round, is adapted to the edges of the wound, and retained by points of interrupted or convoluted suture. To ensure adhesion the attachment at the chin should be left thick and fleshy, and the flap should not consist of mere integument, but contain no small share of the subcutaneous, cellular, and adipose tissues, in order that circulation may be vigorous in the part. The integuments below the chin are naturally loose, and consequently the margins of the wound there are readily approximated. The flap soon becomes œdematous, and remains so for some days; it must be supported by a compress and bandage. After adhesion of its upper part is completed, the mental attachment, which prevented the lower portion from uniting, is to be removed; a bistoury is introduced beneath the non-adhering point, and carried down, so as to divide the attachment, which is then removed by a second stroke of the knife. The lower part of the flap is now laid flat and close to the chin, and supported by a bandage.

In the adult, union may be retarded by the edges of the flap twisting inwards and interposing the beard between the opposed surfaces. When such is the case the offending margins must be pared away.

Case of Rhino-plastic operation for destruction of the lower lip.—The aspect of the patient was disgusting in the extreme, having lost the half of the lower lip and a portion of the cheek, to near the angle of the maxilla, from the effects of cancrum oris.

Operation.—Having traced with ink the dimensions and form of the flap, which the operator determined to procure from the lateral superior and sterno-cleido-mastoidean portion of neck, he dissected it off, taking care not to wound the jugular vein. The edges of the excavation having then been pared, the flap was twisted on the narrow band that still connected it with the parts in the neck, the edges placed in apposition with the newly-pared ones of the opening in the cheek and lip, and both retained in due connection by the employment of the twisted suture in five places. The side of the integuments in the neck were also reunited by three sutures.

SCURVY.

Push a broad-shouldered lancet into the fungoid portion of gum, carry it between the teeth as low as the transverse alveola process will permit, and make a complete perpendicular section of each portion of it, the lancet is then drawn horizontally across the gum. The operation must be repeated if necessary.

EXCRESCENCE OF THE GUM.

The patient is firmly seated on a chair, opposite a clear light, the head being fixed against the breast of an assistant, and the mouth secured by a speculum oris. The operator elevates the tumour as much as possible with a hook, and with a scalpel dissects it away from the gum.

Plate 6.

Fig. 3.

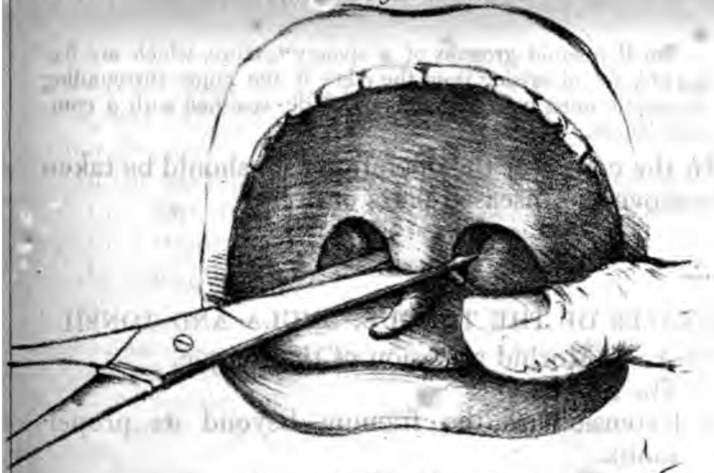


Fig. 2.

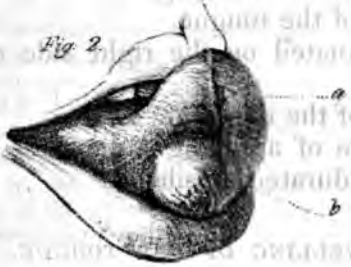


Fig. 1.

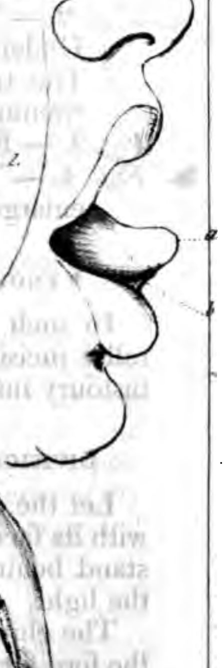
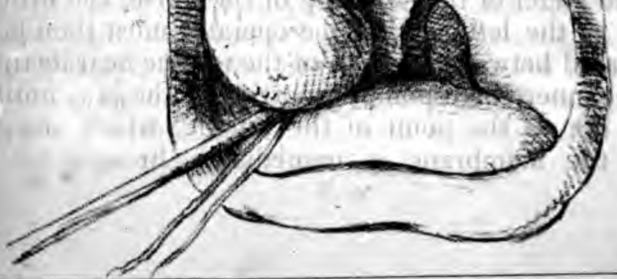


Fig. 4.



L. Schönberg lith.

W. P. Cocks del.

Small fungoid growths of a spongy texture, which are frequently found arising from the edge of the gums surrounding the teeth, must be freely and repeatedly scarified with a common lancet.

In the course of the operation care should be taken to remove the diseased parts entirely.

Plate VI.

DISEASES OF THE TONGUE, UVULA AND TONSIL.

Fig. 1. — Morbid adhesion of the tongue.
- *a* The tongue.
- *b* Extension of the frænum beyond its proper limits.

Fig. 2. — Tumour under the tongue.
- *a* Under surface of the tongue.
- *b* The tumour situated on the right side of the frænum.

Fig. 3. — Excision of the uvula.

Fig. 4. — The mode of applying a ligature to an enlarged and indurated tonsil.

ENORMOUS SWELLING OF THE TONGUE.

In such cases, one, two, or even three deep parallel incisions must be made with a fine scalpel or bistoury into the muscular substance of the organ.

DIVISION OF THE FRÆNUM OF THE TONGUE.

Let the child be laid across the lap of the nurse with its face towards a proper light, the operator must stand behind the head so that he does not interrupt the light.

The chin of the child must be gently depressed by the fore finger of the left hand of the nurse, the little finger of the left hand of the operator must then be insinuated between the side of the tongue near its tip and the inner corresponding portion of the jaw, until it can lift up the point of the tongue, which being done, the membrane is immediately brought into view and upon the stretch. Should the child now begin to cry, as it almost always does, the operator can easily place his finger under the tongue, and keep this false frænum tense, while by a single snip with a pair of probe-pointed scissors, he divides it to the true frænum.

To avoid wounding the ranina artery the point of the scissors should be directed downwards instead of upwards.

SWALLOWING THE TONGUE AND HÆMORRHAGE.

The remedy consists in nothing more than in bringing the tongue into into its proper place, and if the infant be suckled, putting it immediately to the breast will give the tongue its natural direction. Should the child be brought up by hand, the tongue should be watched for some time, at least until the bleeding is stopped. The complaint arises from the hæmorrhage being considerable, so as to induce the infant to continue sucking at the part.

RANULA.

The patient being seated on a chair, with his head reclining over the back of it, and the mouth fixed by a bottle cork, the surgeon lays the cyst open from one end to the other; sometimes a circular portion of it is removed with the scissors.

EXCISION OF A PART OF THE TONGUE.

The patient being seated, his head resting on the breast of an assistant, and his tongue protruded to the utmost extent, the surgeon takes hold of, and firmly fixes it between the fore finger and thumb of the left hand, which must be previously covered with linen cloth, and with a pair of sharp scissors in the right removes the diseased portion, including it between two incisions, thus ∧. The edges of the wound are to be accurately placed in apposition, and retained by means of one or two sutures.

Another Method.

A crooked needle drawn to the middle of the ligature, is passed through the substance of the tongue, beyond the diseased part; the middle of the ligature being cut, the needle is taken away and the ligatures remain. There are now of course two ligatures, one of which is to be tied on each side of the diseased part; so as to totally obstruct the circulation in the insulated portion. In a few days the diseased part drops off.

EXTENSIVE TRANSVERSE WOUNDS OF THE TONGUE.

The tongue when sufficiently drawn out of the mouth must be firmly held by the fingers of an assistant, previously covered with a piece of cloth.

The operator then passes a small crooked needle armed with a ligature at one fourth of an inch from the edge of the wound deep into its substance, and passes it out at an equal distance from the edge of the wound on the opposite side. The ligatures are tied secundum artem.

AMPUTATION OF THE UVULA.

The patient is seated on a chair, in a good light, with his head supported by an assistant. The surgeon stands in front of him and makes him open his mouth wide. With a common pair of surgical forceps he lays hold of the uvula, and with a pair of probe-pointed scissors cuts off the diseased portion.

CONGENITAL DIVISION OF THE SOFT PALATE.

The patient being seated on a chair, the face regarding the light, and the head thrown back and supported by an assistant, will open his mouth as wide as possible, to allow a piece of cork to be placed between the last molar teeth on each side, to maintain it in that state. The surgeon then seizes with the forceps one of the sides of the fissure, and fixes in it a curved needle armed with a ligature, which is next to be conveyed posterior to the palate, by means of the porte-aiguille, and to penetrate through it from behind forward about three lines from the edge of the fissure, the needle with the ligature is then withdrawn by means of the forceps; this proceeding is to be repeated on the opposite side of the cleft; a second and a third ligature is to be passed through the palate in the manner already described, — more than three are seldom required. The ligatures thus placed, one near the superior angle, one close to the inferior part of the cleft, and the third almost midway between them, are to be brought out of the mouth; the operator next proceeds to pare the sides of the cleft with a long knife, and of the hard palate also, if it be implicated in the malformation; after which he is to draw the ligatures together, beginning with the one nearest the angle, tie them, and cut them close to the knots.

SCARIFICATION OF THE TONSILS WHEN INFLAMED.

A number of small incisions are to be made with a sharp scalpel, and the flow of blood promoted by the patient frequently applying warm water to the punctures.

ABSCESS OF THE TONSIL.

The pharyngotomos should be held in a straight line from one of the lateral incisors opposite the abscess to the back of the pharynx, and striking the abscess only when the operator is certain that the mouth of the canula is resting fairly upon the spot he wishes to tap; should the abscess be deep in the pharynx, a curved instrument must be used, the fore finger of the operator leading the point of the canula to the abscess as far towards the back of the pharynx by the spine as possible, thus acting behind the larynx.

The internal carotid is generally situated about eight or ten lines behind and external to the tonsils, so that in plunging the bistoury between the pillars of the vellum palati, it would be easier to strike this vessel when the tonsil is in a state of tumefaction, as it is then carried near to the artery.

Removal of the Tonsil by Ligature.

The jaws of the patient are to be separated by means of a dilator, so that when the fauces are teazed by the fingers of the surgeon, the first shall not be bitten, nor the latter interrupted in his operation by the patient shutting his mouth; before the dilator is fixed, a packer's noose made of small whip-cord should be prepared. This is effected by making a single knot upon one end of the thread; this end with the knot is to be brought forward upon the other so as to make a single noose upon itself including the other, and to be drawn tight upon it close to the first. The free end of the thread is then to be passed through the ring of the simple instrument used by M. Chevalier to tighten the knot. The dilator is now fixed; the jaws are well opened. The assistant seizes the tonsil with a double hook, on which hangs the noose.

This last with the ring appended to it is held by the surgeon himself. Now the assistant must pull the tonsil from its loose bed in a diagonal direction across the mouth; its base becomes elongated; the noose is slipped over it and carried by the fingers of the surgeon close around it; the ring is then run up to the gland and the ligature, and tightened, which is repeated daily till the tonsil drops off, which it does in a few days.

Ligature of the Tonsil.

Pass a curved needle, armed with a double ligature, through the base of the enlarged tonsil. The threads are to be separated, and the two belonging to the superior portion are passed through Leveret's canula, which is carried close to the tumour.

The other half is then treated in the same manner, and the threads on each side are to be tightened daily.

Case of Troublesome Hæmorrhage from the Tonsil.—Mr. C. White passed the needle usually employed in the extirpation of indurated tonsils, armed with a double thread, through the edge of the tonsil close to the bleeding artery, then by the help of a hook laying hold of that part of the thread which had been passed through the tonsil, he brought it out of the mouth and withdrew the needle. He now, by the assistance of Cheseldon's tonsil intrument, held one end of the thread upon the side of the tonsil next to the throat, and made the knot by pulling at the other, and included the bleeding vessel in it.

Removal of the Tonsil by Knife.

The tumour being seized in the middle with a hook, it must be pulled towards the opposite side of the mouth by an assistant. This accomplished, the operator introduces a curved probe-pointed bistoury to the lower part of the tumour along his fore finger, with which he depresses the tongue, and cuts from below two thirds up parallel with the palatine arches. Having accomplished this lower section, he removes the knife, takes the hook still fixed in the gland, and completes the section by cutting from above downwards.

FOREIGN BODIES FIXED IN THE ŒSOPHAGUS.

The patient being seated in a chair, with his mouth open, you press down the tongue with the shank of a spoon or a common spatula: by this means, you are often able to see the foreign body. When observed, seize it firmly with a pair of forceps, and extract it. If this cannot be done, it becomes necessary to push it forcibly into the stomach by means of the probang.

ŒSOPHAGOTOMY.

The patient being placed upon a chair, let an assistant bend his head backward in a straight line, and secure it in such a way as to render every lateral motion of it impossible. The operator then places himself immediately before the patient, and, having with his left hand drawn the skin tight into a transverse fold, on the right side of the neck, which is also done on the left side by an assistant, he divides the integuments of the neck with a straight scalpel longitudinally, from the upper part of the trachea down to the sternum. He now separates the cellular, adipose and membranous parts, in short, whatever appears between the sterno-thyro-hyoid muscles and above the trachea, with the same scalpel, which he then pushes on the left side (as the œsophagus generally projects more on this side than on the other) deeper in between the above-mentioned muscles and the trachea, whilst at the same time, in order to obtain room, the lips of the wound are drawn asunder by means of two double-pronged hooks. The deeper seated cellular substance surrounding the trachea is separated by the finger, or, if necessary, by the knife, till the œsophagus is brought distinctly into view, and is then opened longitudinally, beginning from below; and where circumstances require it, the wound is enlarged at the upper part by a crooked pair of scissors. This being done, the foreign substances are to be removed by a pair of forceps; or, if that be not practicable, may be pushed into the stomach. Hæmorrhage is stopped by pressure with the finger, or by ligature. The edges must be accurately brought into contact, and retained by means of graduated compresses to both sides of the external wound, and a bandage, which keeps the head inclined towards the opposite side.

With the requisite caution, taking care not to injure the recurrent nerve, or the thyroid artery.

Caustic Bougie in Stricture of the Œsophagus.

A common bougie of large diameter is first introduced, and when the resistance of the stricture is felt, the patient, by shutting his mouth, makes a mark with his teeth upon the instrument, by which the precise distance of the stricture is ascertained.

This bougie being withdrawn, a mark corresponding to it is to be made on the bougie armed with caustic, which is next to be introduced, and suffered to remain half a minute in contact with the stricture; this may be repeated as often as necessary. In passing the bougie, it will be advantageous to preserve as accurately as possible the curve which the first instrument had assumed, as this greatly facilitates the operation.

Strictures of the œsophagus may occur at any part of the tube, but it most frequently happens in the upper half of the canal opposite the commencement of the trachea.

STOMACH PUMP.

The patient either sits up in a chair or in bed, with the head turned back, the mouth open, and the tongue confined to the bottom of the mouth by the fore finger of the left hand.

An elastic catheter, two feet in length and three eighths of an inch in diameter, is passed gently backwards until its point arrives at the back of the pharynx, on which it bends, and slips through the œsophagus into the stomach. The tube being properly introduced, the free end of it, which projects from the mouth, must be secured between the fore finger and thumb of an assistant. The operator, with a two or four ounce common pewter syringe (with its nozzle dilated, so as to fit the end of the tube), injects tepid water into the stomach. This should be withdrawn immediately afterwards, and a fresh supply thrown in, and by this alternate injection and evacuation, the stomach may be thoroughly washed out, and the poison removed.

OPERATION OF INFLATING THE LUNGS OF AN INFANT.

Carefully remove whatever mucus may be in the mouth, fauces, or trachea, by wiping them as far as you can reach with the little finger covered with a piece of fine dry rag; secondly, inflate the lungs by holding the nostrils, applying your mouth to that of the child, and blowing pretty forcibly into the lungs; then expel the air from them by a gentle but rather firm pressure upon the thorax.

Dr. Blundell passes the fore finger of his left hand down upon the root of the tongue, and into the rima glottidis; then using the tube with his right hand, slides it along the surface of the finger which serves as a director, till, reaching the rima, he inserts the tube at the moment when the finger is withdrawn from it, feeling on the front of the neck whether the instrument be lying in the trachea, or the œsophagus. This done, he takes the child in his hands, and from his own lungs inflates the lungs of the infant, emptying them afterwards by means of double pressure of the hand on the thorax and the abdomen, the latter pressure being necessary in order to urge the diaphragm upwards. Operating in this manner, the artificial respiration is performed with the best success. There ought to be five and twenty respirations in a minute, the new born child breathing faster than an adult.

Or insert a quill or female catheter into one of the nostrils, the child being up to its neck in warm water, close the mouth of the other nostril, and blow into the quill till the chest is distended with air, and proceed as above.

Operation on the Adult.

A short tube is inserted into one nostril, the pipe of a pair of bellows is inserted into the tube; the other nostril and the mouth are closed by an assistant; the air is then gently forced from the bellows till the chest is distended, when the pipe is withdrawn, and the chest pressed to force the air out, and this process is repeated again and again so long as the artificial respiration is required.

TRACHEOTOMY.

The patient being seated in a chair, or placed on his back on a table, with his head resting on pillows and inclined backwards as much as the difficulty of breathing will permit, the operator having ascertained the exact situation of the cricoid cartilage, makes a perpendicular incision, commencing from the inferior edge of the cartilage and carrying it downwards towards the sternum for an inch and a half or two inches, dividing the skin and fascia; he then proceeds by cautiously penetrating between the sterno-hyoid and thyroid muscles, till the deepest layer of the cervical fascia is seen, which is to be slit open, when the trachea will be exposed. The motion of the trachea is secured by means of a strong dissecting hook; a portion of it is to be removed by the knife or scissors, after which a canula may be put into it.

In extracting extraneous substances from the larynx or trachea, the surgeon introduces the straight forceps between the divided edges of the tube, so as to separate them, and at that moment, if the body is free, it escapes, being expelled by the air which proceeds from the trachea. If the substance be fixed in some part of the canal, it must be extracted with the curved forceps, whose curvature must be directed above or below, according to the place it occupies. In case of extraneous substances, the wound is united immediately, unless blood introduced into the trachea requires an opening there to give it vent.

Another Method.

Dr. Murray recommends the surgeon to raise a piece of the integuments between the finger and thumb, and cut it away so as to form an oval or circular wound.

After the first incisions have exposed the dense junction of the muscles in front of the trachea, it is better to lay the latter bare by scraping with the nail, the director, or any blunt instrument, than to use the knife in a deep wound obscured by blood and in the midst of important vessels which you cannot see. When the trachea is rendered sufficiently bare to admit of being seized upon by the double hook, the remainder of the operation, although the most important part of it, is comparatively safe, and may be completed either with the knife or scissors.

If, with the former, after the trachea is pierced with a sharp-pointed knife, a round piece of it may be cut out, including that transfixed by the double hook, by means of a straight-buttoned bistoury; if with the scissors, a lozenge-shaped piece may be cut away.

Case of a Bean extracted from the Trachea of a Child four Years old. — After dividing the integuments about three inches long, and pushing the thyroid body upwards, the operator cut directly down in the medium line (for the trachea could not be felt at all), and in a subsequent and deeper incision, the air issued out forcibly. The wound was enlarged upwards and downwards until three rings of the trachea were divided; the external wound was kept open by means of blunt hooks, and that of the trachea distended by a pair of polypus forceps. A pair of narrow-curved forceps were introduced into the aperture, the bean was felt, seized, and extracted.

LARYNGOTOMY.

The patient being laid on a table, with his head supported by a pillow, and thrown moderately backwards, the surgeon feels for the membranous space situated between the thyroid and cricoid cartilages, and makes a perpendicular incision about an inch in length through the integuments, platysma-myoides, and between the sterno-thyroidei and sterno-hyoidei muscles. Any vessels that may have been divided are next carefully secured, and the bleeding having entirely ceased, it only remains to push the knife through the crico-thyroid membrane.

IMPERFORATED MEATUS AUDITORIUS.

If a thin membrane closes the aperture, it must be punctured with a fine-pointed scalpel, and the adhesion of its sides prevented by the introduction of a dossil of oiled lint, or a small portion of an elastic bougie. The parts must be dressed daily until the edges of the wound are rendered callous.

Method of removing Wax from the Ear.

Throw in, once a day, by means of Abernethy's syringe, some warm milk and water, or water in which a little curd soap has been dissolved. Assistance may likewise be given by using, along with the injection, a blunt probe, by which the bottom of the passage may be cleared out.

Perforating the Lobes of the Ears.

The patient being seated, and the head secured by an assistant, the lobe of the ear should be stretched upon a piece of cork placed beneath it. The surgeon is now to perforate it with an instrument called a piercer, and, having pushed it so far through that the tubular part of it is freely out on the opposite side, the cork must be withdrawn, with the perforator sticking into it.

Plan for the Removal of Peas, Cherry-stones, Glass Beads, &c. from the Meatus.

The side of the head on which the ear is situated that contains the foreign body must be placed on a pillow, and holding it close whilst the pillow is struck with considerable force, it is thus frequently shaken out.

Peas and beans, if allowed to remain long in the ear, are apt to swell, and to become so large as to be extracted with great difficulty; in such cases they are to be broken down by means of a small scoop or forceps, and extracted piecemeal.

Puncture of the Tympanum.

The patient, being placed before a very light window, bends his head to the side opposite to that to be operated upon, and presses it against the breast of an assistant, so that the rays of light fall directly on the bottom of the external auditory canal. The assistant carries one hand upon the temple, and with the other raises the outer ear to straighten the curve of the cartilaginous part of the canal. The operator introduces the canula of a small trocar into the meatus, and passes it down to the anterior and inferior part of the membrana tympani; by this means, the long head of the malleus is not interfered with.

The canula being properly placed, the trocar is to be pushed on gently through it, until it has penetrated the membrane, care being taken not to penetrate too far into the tympanum.

Ligature of Polypi of the Ear.

When the base of the tumour is near the anterior opening of the auditory canal, it is sufficient to form, with a waxed thread, a noose, with a surgeon's knot.

> This knot is made by making a ring upon the ligature, through which one end of it must be passed twice.

The polypus is engaged in this noose, which is then pushed up to the base, either with the finger or forceps. When it has arrived there, the two ends are drawn in opposite directions, by fixing one of them with one hand and by making the other turn round the united branches of the forceps, which have previously seized it. The constriction is performed at pleasure by these means; when it is sufficient, the forceps is withdrawn, and the tumour being abandoned, soon falls.

If the polypus be more deeply seated in the coats of the meatus, if it be loose in this canal, and if, so to speak, it recede before the ligature; in order to draw it outwards, employ an erigne, whose double points will hook it, and which you must confide to an assistant: then slip upon this instrument the noose of a waxed thread, whose two ends must be passed into the ring of the serre-nœud, and which must be conducted by small lateral movements to the base of the tumour: draw towards yourself the thread, which will thus perform the constriction, which is kept at the same degree by fastening the two ends to the clefts of the serre-nœud.

Second Method.

The body of the tumour is depressed, and pulled outwards by the flat end of a probe slightly bent. Delicate forceps are introduced gently, and passed up to the neck of the polypus, which is then firmly grasped. By combining slight twisting with gentle extractive force, it is readily removed.

The Method of introducing the Probe into the Eustachian Tube.

Between the root of the pterygoid process and the basilary apophysis, there is a cul-de-sac or excavation, into which the extremity of the probe may be readily insinuated in attempting to introduce it into the tube by the middle meatus. In fact, if, when the end of the instrument gets into the pharynx, it be raised in the least degree above what is necessary, and if it do not fall exactly into the gutteral canal of the tympanum, it will almost always enter this excavation—a circumstance which requires some notice, because injections are frequently thrown into this place instead of the natural canal.

In order to avoid this mistake, it is preferable to introduce the probe by the inferior meatus, because, when it has once got behind the extremity of the inferior turbinated bone, it will only be necessary to raise the end of it a little outwards for it to slide, almost of its own accord, into the place required; and this is occasioned by the levator palati muscle, which, as it descends in the velum palati, represents a column directed obliquely from above downwards, from behind forwards, and from without inwards.

This muscle, the pterygoid process, and the tensor palati, describe a triangle with a superior base, in which the Eustachian tube is enclosed, so that, when the instrument gets as far as the posterior part of the meatus or the floor of the nasal fossæ, it is precisely in the summit of this triangle. Then, by tracing the gutter which it represents to its upper part, it will enter directly into the tube. We must be careful, however, not to pass it beyond the fleshy pillar, as it would then be difficult to find the opening we are in search of. It is also proper to observe, that the membranous duplicature which envelopes the inferior turbinated bone is generally lost in the superior parieties of the gutteral duct of the ear, which renders the operation extremely easy, by attending to the preceding directions.

This canal is situated some lines behind the middle meatus of the nasal fossæ, and the notched portion of the cartilage looks forwards and upwards.

We should bear in mind that this duct is directed outwards, backwards, and slightly upwards; therefore we should give to the tubes with which we penetrate into it to any depth, whether for the purpose of breaking down obstructions or conveying injections, but a very gentle curvature.

SALIVARY FISTULA.

Perforate the cheek with a small trocar from without inwards, and obliquely downwards from the side of the fistulous opening, exactly opposite and contiguous to the under extremity of the upper portion of the duct, taking care not to wound the gums; then introduce a piece of leaden probe, the size of the stylet, through the canula. This must remain in the cheek till the sides of the opening become callous. The lead being withdrawn, pare the edges of the fistulous aperture with a scalpel, and bring the extremities of the natural and artificial ducts in apposition, and retain them by means of adhesive plaster.

In recent wounds of the salivary duct, the edges are to be brought in contact and retained by means of sutures or adhesive plaster.

Desault's Plan.

The patient being seated upon a high chair, with the head supported against the breast of an assistant, he introduced into the mouth two fingers of the left hand, which, being placed opposite to the fistula, between the dental range and the cheek, served at the same time to stretch the integuments and to preserve the gums from the point of the instrument. He applied the point of the hydrocele trocar, armed with its canula, before the opening of the superior portion of the duct, which the oozing made sensible, and inserted it into this place, directing it a little forwards. An assistant secured the canula, while the surgeon withdrew the stylet; he then passed a thread through it into the interior of the mouth. The canula was withdrawn. To the thread passed into the mouth was attached a seton which it drew from within outwards in such a manner as not to bring it between the borders of the external opening, where the thread alone passed, and was then secured upon the cheek by adhesive plaster. Every day the precaution was observed of changing the seton, increasing it a little, and with the essential precaution of not bringing it between the borders of the wound, which was covered with adhesive plaster. The edges of the external opening were cauterized about the fiftieth day. The wound soon healed, and the patient left Paris three months after the operation perfectly cured.

WRY-NECK.

The patient being seated on a chair, and the head fixed against the breast of an assistant, the operator makes an incision, two or three inches long, in the course of the muscular fibres, through the integuments, and the contracted portion having been fairly exposed, the handle of a knife is carried behind it, in order to protect the vessels beneath. This part is to be divided by one or more cuts of the scalpel or bistoury, or a director may be introduced, by which the knife is guided under the muscle, so that its division is easily accomplished by drawing the knife outwards.

TUMOURS.

If a tumour be not pendulous or large, make an incision through the integuments covering it in the direction of the muscular fibres from one side to the other. The external incision should be free, so as to allow sufficient room to dissect it from the surrounding parts. In a large tumour two incisions are to be made, meeting like two segments of a circle, thus ().

Malignant Tumours. — Make the incisions at a distance from the disease, and remove all indurated, discoloured, and adherent integuments. Those which are small and have a slender base may be removed by ligature. The vessels are to be secured by ligature. The edges of the wound are brought together and retained by adhesive straps.

Adhesive plaster should be laid on in strips, and these should be at small distances from each other, viz., about a quarter of an inch at most, if the part requires close confinement, but when it does not, they may be at greater distances. This precaution becomes more necessary if the bleeding is not quite stopped. There should be passages left for the exit of blood, as its accumulation might prevent the union, although this does not always happen.

ENCYSTED TUMOURS OF THE HEAD.

Make an incision through the integuments covering the tumour, so as to expose the cyst. It is then worked about and detached from its surrounding connections with a small fine spatula passed round it between these and the cyst. The tumour is thus quickly and neatly unkernelled, and starts out from its socket.

When a tumour is very large, a circular portion of the integuments is to be detatched from the summit, and the operation then finished with the spatula.

Sir A. Cooper recommends an incision first to be made into the cyst evacuating its contents, and then, by means of a pair of forceps, forcibly tearing out the parietes of the tumour.

In extirpating tumours, the primary consideration with the surgeon ought to be to remove the morbid parts without injuring the capsule which defines them. If he accomplish this, he has nothing to dread from a return of the disease.

TUMOURS EXTERIOR TO THE BALL OF THE EYE.

Make a free incision with a small scalpel through the integuments along the edge of the orbit, in the direction of the fibres of the sphincter oculi.

The tumour being exposed, lay hold of it with a small hook, and dissect it carefully from the contiguous parts.

PAROTID GLAND.

Case.—An incision was made so as to preserve a flap of skin, an inch and a half broad, along each side of the swelling; that on the anterior part was first separated, and the tumour being drawn outwards, it was detached from the subjacent parts from before backwards for two thirds of its extent; the posterior flap of the skin was then separated, and the tumour detached from its remaining adhesions from behind forwards. The operation lasted six minutes, and the difficulty and hazard attending it may be readily perceived. All the branches of the facial nerves were divided; a piece of the masseter muscle was left quite bare; the dissected sterno-mastoid lay on one side, and the temporal, external maxillary and auricular arteries were of course divided along with several arteries of the neck, yet the largest of these being tied, the bleeding was very inconsiderable. The two flaps of skin met so accurately, that by means of adhesive straps they were kept within a line's distance of each other along the whole course of the wound. There was no secondary hæmorrhage or symptoms of consequence, and by the beginning of the third week the wound was entirely healed.

TUMOURS LYING POSTERIOR TO THE PAROTID DUCT.

The first point is to expose the duct, just where it passes from the edge of the masseter; it is then to be traced forward along the whole extent of the tumour.

In doing this the duct is to be left attached to the integuments on one side, and with the fingers the coverings of the tumour and the duct are to be turned aside, a hook is to be struck into the tumour, which will generally, from the quantity of loose fat in which it lies imbedded, be easily pulled outwards, when it may be detached by snipping the fatty process by which it is connected to the deep-seated parts. By cutting this, the nutriment vessels of the tumour, which are derived from the internal maxillary, will generally be divided, but they will seldom be found of such a size as to require the ligature. The facial vein is generally pushed towards the angle of the mouth by the tumour, but even if it did lie over the morbid parts, and if it were cut across, it would prove of very little consequence.

The parotid duct, having emerged from the parotid gland, crosses the masseter, upon which it is immediately applied. It is covered by nerves; upon its superior margin also lies the transverse facial artery. It penetrates the mucous membrane of the cheek by a small opening, around which there is a loose fold of the membrane. The opening is situated opposite to the first grinding tooth of the upper jaw, and at the distance of about a quarter of an inch from the union of the cheek with the gum.

EXTIRPATION OF A GLAND BELOW THE JAW.

When a tumour is to be extirpated below the jaw, the operator will most easily accomplish his purpose by placing his patient on a chair, and reclining his head on the breast of an assistant, who ought to stand behind him.

The jaw of the patient must be kept closed, while the surgeon by a crucial incision through the skin, platysma myoides, and fascia, exposes the tumour, which he is fully to uncover, by dissecting the flaps to a side. Next he is to push his fingers between the swelling and the surrounding parts, working his way among the cellular membrane, till at the lower end of the tumour he feels the pulsation of the labial artery.

By insinuating the finger along the tumour, following the course of the vessel, he will ascertain its connections. If he find that the artery is not imbedded in the substance of the swelling, he may, by continued working with the fingers, insulate and remove the tumour, without injuring the trunk of the labial artery.

Generally, however, he will find the vessel so closely connected with the morbid mass, that it would be out of the question to attempt their separation. Here the plan to be pursued is evident. A ligature is to be passed round the labial artery, just where it enters into and passes out from the diseased gland, and next the vessel is to be divided at both places, nearer to the gland than where the threads have been applied.

> On the dead subject (says Mr. Burns) I have found it easiest to detach the gland, when I begin its separation, nearest to the angle of the jaw, and proceeded towards the chin, near to which the sub-mental artery will require to be snipped across. It is demonstrable that in this way the sub-maxillary conglomerate gland will be torn away along with the tumour, but this, so far from proving disadvantageous, will add to the security of the patient. But let the surgeon remember that, in many subjects, the sub-maxillary and sub-lingual glands are connected by a communicating slip, which will require to be cut across, else the sub-lingual gland will be pulled away, which, to say the least, would be generally unnecessary.

THYROID GLAND.

Make an incision of an elliptical shape, if the tumour be large; or, if the integuments be diseased, it is to be made over it with the long diameter directed from above to below. The surface of the swelling is next to be uncovered, by dissecting back the integuments on both sides; then the finger is to be insinuated between the skin and the muscles, pushing it upward and backward till it comes in contact with the thyroid artery, round which a ligature is to be passed with a blunt needle. In a similar manner the other superior thyroid artery and the two inferior vessels are to be secured; when the whole gland is to be removed.

By these ligatures we cut off the circulation into the tumour, and consequently are left at liberty to finish the operation by cutting the vessels nearer to the morbid parts than where the threads have been applied, and by dividing the sterno-hyoid and thyroid muscles above and below the tumour, which is afterwards to be detached from the trachea and gullet by catious working with the fingers. In this way we may remove one or both lobes of the thyroid gland; but the operation is difficult, tedious, and not without danger.

GANGLION.

Make an incision through the integuments covering the tumour with a scalpel, and with the point of the same instrument carefully destroy its connections with the surrounding parts. The cyst must be removed unopened.

When the tumour has burst or is ulcerated, it is best to remove the diseased skin together with the cyst, and of course the incision must be oval or circular.

Sir A. Cooper recommends puncturing a ganglion with a fine needle, when we are unable to burst it by a blow or excite its removal by pressure or irritation. He has never seen this treatment followed by inflammation or any serious consequences.

CANCER OF THE EYE.

The patient being placed horizontally, and the lids separated by an assistant, the eye should be drawn forwards by means of a common double hook or ligature. If the eye be very protuberant, so as to be fast bound down by the eyelids, a small incision may be made with a scalpel in the outer canthus.

The precaution of previously cutting the external commissure is always essential, both because more facility results in the section of the nerve (the introduction of the instruments into the orbit being then more free), and because after this section there can be no obstacle to the escape of the organ from its cavity; on the contrary, when the eyelids are not divided, if it should be a little bulky, they will impede it and incur the risk of being irritated or torn by attempting to force the passage.

A straight narrow-bladed knife, slightly curved on its sides, having a double edge, should then be carried around the eye, close to the circumference of the orbit, care being taken to avoid cutting into the tumour. The optic nerve and muscles of the eye are to be divided as near to the foramen opticum as it is possible to carry the knife.

The hæmorrhage consequent upon the operation is easily checked by washing out the orbit with a little cold water, after which, the lachrymal gland should be carefully removed.

In extirpation of the eye it is never necessary to tie the ophthalmic branches; their position and relations with the bone enables us to compress them readily with charpie or sponge pressed into the cavity and supported by a bandage.

CANCER OF THE FACE.

The patient being seated on a chair, opposite a window, and turned a little to one side, so that the light may fall directly on the disease, the head firmly fixed on the breast of an assistant, the operator makes a circular incision round the upper part of the ulcer, and at the anterior and inferior part of its base, through the skin and cellular substance. By means of a double hook or forceps, he draws the diseased mass forwards, and carefully dissects it from the subjacent parts. Secure the vessels if necessary, and bring the edges of the wound in contact, by means of the interrupted or twisted suture.

CANCER OF THE BREAST.

The patient being seated on a chair, her head supported by an assistant, with the shoulders drawn back as much as possible, and retained in that position, the operator places himself before and a little to the side of her, placing the fingers of the left hand on the same line to stretch the skin outwards and downwards. While an assistant raises the breast, he makes a semi-elliptical incision through the skin and cellular substance, on the inferior and external side of the tumour and a second incision on the inner side, which commences and terminates at the same point as the first.

The assistant then draws the integuments as far asunder as possible, while the operator is dissecting the diseased mass from the surrounding cellular substance above, and the pectoral muscle below.

Every portion of indurated skin or cellular substance must be removed, and the arteries secured by ligatures the moment they are cut. The edges of the wound are to be brought into close contact, and retained by adhesive straps, supported by lint and a common roller.

Many of the best modern operators always make a point of removing the nipple, in every instance in which it is judged expedient to take away a portion of the skin at all. The surgeon must remove such portion of the integuments covering tumours of the breast, as is evidently affected, appearing discoloured, puckered, or closely attached to the diseased lump beneath.

EXCISION OF THE NECK OF THE UTERUS.

The patient being properly placed on a high table, as for the operation of lithotomy, and secured by assistants, and the vagina cleansed out by injections, and softened with lard or pomatum, the operator commences by pushing through the substance of the uterus two or more needles, each armed with a wax thread four times doubled. The direction of the stitches is from behind forwards, also from before backwards, and from the sides to the centre.

The greatest caution is necessary that the needles do not go too far, and catch upon the vagina, or puncture one of the arteries, or the great veins behind the coats of the vagina.

The point of the needle, when through, must be bent immediately with the point of the finger, and seized and drawn through with a pair of forceps. Very often two of the threads will suffice to draw down the uterus into the vagina.

The labia being separated by the fingers of an assistant, the operator introduces a blunt pointed curved bistoury into the vagina, and removes the cancerous portion of uterus. The incision must be made in curved lines, first boldly, and then cautiously for fear of hurting the vagina.

The needles are small and crooked, and made of soft steel, so that their points can be easily bent.

Another Method.—The patient being placed as directed, the operator commences by introducing the speculum into the vagina, and gently dilates this cavity laterally by means of the instrument. He then with a pair of curved pointed forceps or a double hook lays hold of the os tincæ. The speculum being removed, he then draws down the neck of the uterus below the meatus externus, and with a curved bistoury severs it close to its body from below upwards.

Case of Extirpation of the Uterus.—The operator first introduced an instrument (pince de museux) with which he seized the cervix uteri as high up as possible, and then dragged it down slowly and cautiously, the body of the uterus following it, till the whole came in view of the os externum. The artificial prolapsus thus affected, the operator fixed the organ in its new situation, by means of another instrument (pince erigne) confided to the hand of an assistant. He then examined the rectum, and found that the gut had not come down with the uterus. He next introduced his finger between the anterior parietes of the vagina and the corresponding face of the retracted tumour, till he came to the junction of the two, when he introduced a bistoury with his right hand, divided the cul-de-sac at the spot above mentioned to the extent of an inch, and then withdrew the instrument. Through this wound, the operator passed his finger, and divided some loose cellular tissue, till he came to the reflection of the peritoneum, from the bladder over the uterus. The simple division of the peritoneum, where it forms an angle or fold between the urinary bladder and uterus, enables the scalpel to be carried round the os uteri in extirpation of the uterus. This he divided with the bistoury once more introduced. The peritoneal incision was next enlarged, first on one side, and then on the other, with a probe-pointed bistoury. Having searched for the broad ligaments, he passed a ligature around each, to prevent hæmorrhage, and then divided them. The peritoneum passing from the rectum to the uterus was next divided, and the uterus itself dissected from the neighbouring parts. — *Professor Recamier.*

EXTIRPATION OF THE AXILLARY GLANDS.

If the axillary glands are found to be small, hard, and loose, they must be removed. The surgeon, having fixed them upon the side of the chest with his fore and middle fingers, makes an incision with a scalpel through the skin covering them, and before removing the fingers, he draws them out, having first transfixed them with a common hook.

If the gland be deep-seated, clustered, and indurated, the operator should dissect to little more than the extent of its outward hemisphere, and then insulate by working with the fingers round the stringy shreds and vessels by which it is still held. A ligature is to be put, and the tumour cut off.

CANCER OF THE RECTUM.

The patient being placed as for the operation of lithotomy, the surgeon commences by making an elliptical incision through the integuments close to the verge of the anus, extending to an inch before and the same behind it on each side. He then by a careful dissection separates the lower portion of the rectum from the adjacent skin and cellular tissue.

This being accomplished, he introduces the forefinger of the left hand into the gut, and by means of it and the thumb pulls the intestine lower down. As soon as the rectum is exposed, its anterior portion must be carefully and cautiously dissected from its connections. This done, the posterior and lateral portions are next separated from the adjacent parts. If the disease does not involve more than the mucous membrane, or if it be confined to the tunics of the gut, and extends no higher than an inch, the whole may the skin, commencing above the abdominal ring, and extending to the base of the tumour. But if the tumour be of great magnitude, or the skin of the scrotum diseased, or if there be a fungous protrusion from the testicle, two elliptical incisions must be made, so as to include within them all that portion of skin which is diseased. A second incision lays bare the cord, and freely exposes the tunica vaginalis. The spermatic cord being laid bare, and freed from the loose cellular attachments, then separate the artery and vein from the vas deferens, and pass a ligature round the two former, and divide the whole cord about half an inch below it, after which dissect the testicle out from its connections.

The principal arteries are easily taken hold of with the tenaculum or forceps, and secured with a ligature. They are less retractile than the cellular tissue in which they are imbedded, and it is not unusual to see them project a line beyond the extremity of the divided cord.

The edges of the wound are to be drawn together by a few stitches, supported by adhesive plaster, lint, and the bag truss.

Graefe recommends that the cord be carefully exposed and tied very tight, so as to benumb the sensibility of it. It is to be divided one third of an inch from the ligature, the testicle is then dissected from the surrounding parts without the risk of hæmorrhage.

Another Method.

The surgeon grasps firmly the posterior part of the scrotum between the fingers and thumb of the left hand, so as to make the integuments covering the testicle tense anteriorly.

With a scalpel he then makes a perpendicular incision of sufficient extent through the centre of the integuments, and removes the gland as directed above.

Another Method.

The cord and integuments covering it are to be pinched up and firmly held between the fore-finger and thumb of an assistant, just above the spot where the parts are to be divided, and with the other he separates the diseased testicle from the healthy one. The operator taking the diseased gland in his left hand raises it so as to make the scrotum tense, and with a large scalpel removes it and its scrotal coverings with one stroke of the knife. The incision is commenced at the raphe of the scrotum, and carried obliquely upwards and outwards. The arteries are to be secured and the edges of the wound brought accurately together, and retained by means of one or two sutures.

Another Method.

Dr. Aumont makes his incision through the integuments of the scrotum, upon the posterior surface of the tumour; and finishes it after the manner pursued by other practitioners in operating on the anterior surface of it.

SARCOCELE.

Make an incision opposite the abdominal ring and expose the spermatic cord; look for the principal trunk of the spermatic artery, and tie it sufficiently high to interrupt the circulation of the blood through all the small branches which it sends off. Avoid tying the vas deferens and spermatic veins.

CANCER OF THE SCROTUM.

An assistant grasps the back of the scrotum with his right hand, so as to make the integuments tense on the fore part. The operator then, with a scalpel or bistoury, makes a free incision through the sound integuments round the ulcer.

He draws the diseased mass forwards with a hook, and dissects it carefully from the scrotum. If the tunica vaginalis be implicated in the disease, it will require great caution in its removal to avoid injuring the testicle. Every vessel which bleeds should be tied.

REMOVAL OF WARTS FROM THE GLANS PENIS BY THE LIGATURE.

The patient being placed in the position for lithotomy and secured, an assistant supports the body of the penis with his left hand, and with a hook in his right stretches the part to be operated on. The surgeon then takes hold of the healthy part of the glans with the fore-finger and thumb of the left hand, and with the right pushes a straight flat needle, with a large eye, armed with a slip of inelasticated India rubber doubled, through the skin and erectile tissue immediately under the base of the wart, and carries it out on the opposite side. The needle being removed, the two ligatures, which are of an equal length, are to be tied one on each side the tumour as tightly as they can be drawn without breaking them.

Cut with a sharp pair of scissors a thin slice of good India rubber, an eighth of an inch square, and an inch in length; stretch it between the fore fingers and thumbs of the right and left hand with a very quick see-saw motion, until you get it of a proper thickness and length, which must be regulated by the size of the tumour; when stretched, secure it by tying a small piece of twine to each end of it, and fasten it by two nails to a board: place it thus prepared in a dry situation, but at the same time exposed to a free current of cold air in a northern aspect.

As soon as it feels the heat it will contract very much, and produce one of the best known ligatures for destroying the circulation in tumours.

With the Knife.

Transfix the wart with a small sharp hook, and pull it forwards; during its utmost extension the surgeon, with a sharp and thin-bladed knife, severs it from its attachments close to the glans penis with one sweep; but if the tumour have a broad base, it will be necessary to remove it by a careful and patient dissection, taking with it the whole of the indurated erectile tissue and skin. If any of the vessels throw out a large stream of blood, it will be necessary to secure them with a ligature, after which apply a piece of lint dipped in spirits of turpentine, and secure with tapes.

THE PUNCTURING OF HYDROCEPHALUS.

The double-headed roller being put around the head from forehead to occiput, the ends are crossed and given to an assistant, who is to tighten them gradually as the water flows, to guard against the collapse which the sudden loss of pressure would occasion, and which has been sometimes fatal. For this reason, also, the whole quantity in the brain should not be evacuated at one tapping, eight ounces being as much as it is prudent for an infant of three or four years of age to lose at a time. The child is to be placed upon the knees of an assistant. The surgeon then holding the trocar in his right hand passes it in at the anterior fontanelle, through the integuments and membranes on one side or other of the longitudinal sinus. This being done, he withdraws the stylet, and allows as much water as it is prudent to draw off to flow through the canula; then withdraws the latter, and closes the wound with a piece of adhesive plaster; the roller bandage is then removed, the head rubbed with brandy, and the laced cap applied as tightly as the child can bear it.

PUNCTURING OF THE CHEST.

The patient being laid in a horizontal posture, and the diseased side brought over the edge of the bed, the skin of which is pulled up and retained in that posture by an assistant; an incision about two inches long is to be made with a scalpel through the integuments covering the space betwixt the sixth and seventh true ribs, equi-distant from the spine and sternum.

The intercostal muscles are next to be carefully cut through by an incision smaller than the external one. The pleura costalis is now exposed, and a small puncture may be made through it. Water, pus, or fluid blood will readily escape through a small aperture; but if coagula be found, the incision must be enlarged. To avoid the intercostal artery, cut through the intercostal muscles close to the superior border of the seventh rib. In order to evacuate the fluid, the patient after the puncture should place the wound in a depending posture by lying on his side.

After the evacuation of the contents of the chest, the wound is to be closed and dressed with adhesive plaster.

PUNCTURING OF THE PERICARDIUM.

The crown of a large trepan is to be applied to the sternum, after the integuments have been cut through a little below the place where the cartilage of the fifth rib unites to the sternum, by which a triangular space is denuded, situated between the two laminæ of the pleura, a little nearer to the left than to the right side. When the pericardium is exposed, it is to be punctured with a bistoury or trocar.

By operating in this way, the contents of the pericardium can be discharged without injuring the pleura, and consequently without opening the cavity which lodges the lungs.

PUNCTURING OF THE ABDOMEN.

The patient being placed in a horizontal posture, with the head a little elevated, a flannel roller is applied to the upper part of the abdomen, and gradually drawn tighter as the water flows; this moderate pressure must be continued during the evacuation, to prevent the syncope consequent upon the sudden abstraction of a large quantity of fluid; then pass a trocar or lancet into the linea alba, from one to two or three inches below the navel.

Some surgeons puncture the abdominal parietes with a lancet, and then introduce a blunt-edged rounded trocar and canula.

If it be the trocar that is used, and if when it is withdrawn a sudden stop of the discharge happens, pass a blunt probe through the canula, in order to remove the obstruction of the free passage of the fluid through the tube. When the fluid has been let out, the canula must be removed, and a bit of lint and emplastrum saponis put over the puncture. The compression of the abdomen is still to kept up.

Sometimes the water in ascites makes a pouch between the uterus and rectum, so as to enable it to be drawn off at this point.

PUNCTURING AN OVARIAN CYST.

Make an incision half an inch in length through the integuments at the most prominent part of the tumour, then push a large trocar into the cyst, withdraw the stylet, and allow the fluid to flow through the canula.

DROPSY OF THE UTERUS.

Introduce gently an elastic gum catheter oiled through the os internum into the cavity of the uterus; withdraw the wire, and allow the water to pass off.

Spina Bifida.

The tumour must be carefully punctured with a fine needle or a very small trocar, and the contents allowed to escape. When the fluid is discharged the aperture must be closed by means of adhesive plaster, over which a plaster of mild salve and a compress are to be laid and confined either by adhesive straps, or a roller. If the fluid collects again it should be evacuated with similar precautions, and the after treatment regulated as before described.

TAPPING FOR HYDROCELE.

The patient is to stand before the surgeon, who, with his left hand, should grasp the tumour on its back part, so as to push the contained fluid into the anterior and under part of the swelling. The trocar is to be pushed through the integuments and tunica vaginalis, the point being directed obliquely upwards, to prevent wounding the testicle, which always lies at the back part of the tumour.

> Withdraw the trocar, and when the fluid is all evacuated through the canula, the orifice may be covered with a dossil of lint and sticking plaster.

Congenital Hydrocele.

The patient being properly placed, and the tumour made tense, a small trocar is pushed through the integuments at the anterior and inferior part of the scrotum. Withdraw the stylet, and allow the fluid to escape. This being accomplished, examine minutely the bag so as to ascertain if, as is sometimes the case, a portion of intestine has not descended into the sac, and if so reduce it as soon as possible. When returned, make a strong pressure upon the external abdominal ring by means of the fingers and a small firm cushion, so as to cut off all communication between the abdominal and scrotal cavities.

The wine and water may now be injected. When evacuated, the pressure may be removed and a truss applied.

> The best mode for relieving hydrocele in infants is to pour cold water, from a height pleno rivo, upon the part. Two quarts at least of water should be thus let fall morning and evening, through the spout of a tea-kettle.

INJECTION.

As soon as all the fluid has been discharged through the canula,

> It is necessary prior to using the injection to examine carefully the state of the testicle, so that palliatives may be used if the gland be swollen.

a common pewter syringe, or India rubber bag and pipe, which fits the canula, are to be employed, and the cavity distended, with two thirds port wine and one of water, to its former dimensions.

Fig 1

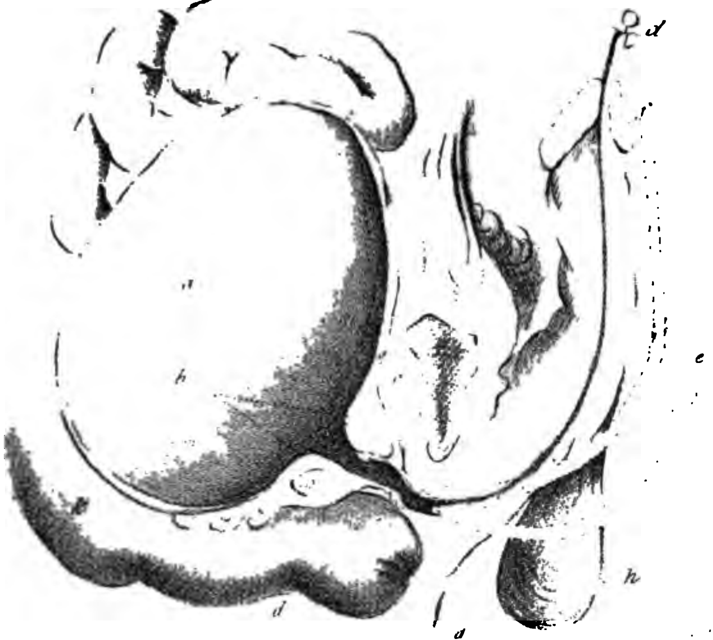
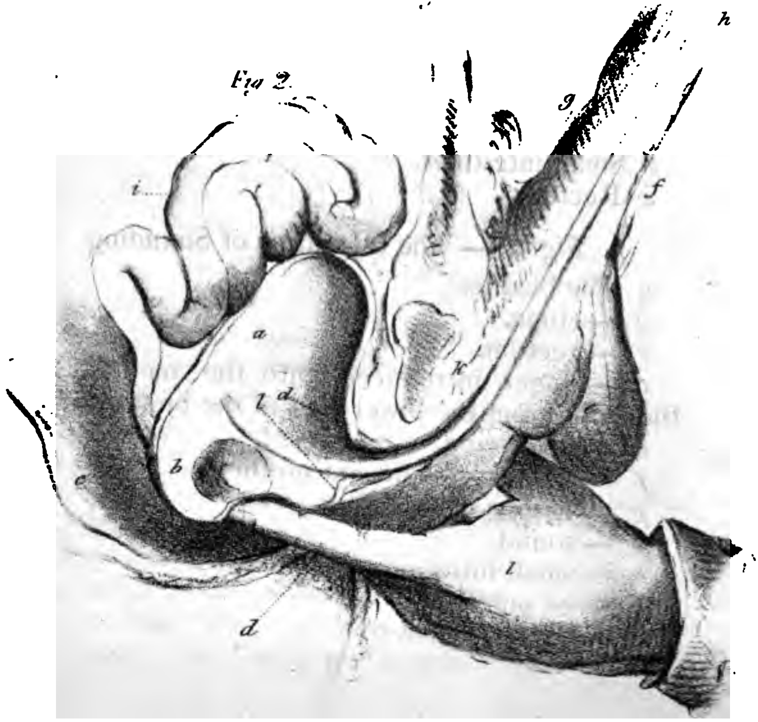


Fig 2



W.P. Cocks del.

L. Schonberg lith. 100, Hatton Garden.

This fluid is to remain till considerable pain in the back and loins is perceived. When the injection has been retained for a proper time the thumb is removed from the mouth of the canula, and the fluid allowed to pass off through it. It is then removed and the wound dressed. In general cases, a few minutes will suffice.

PLATE VII.

Represents the various movements of the catheter that are necessary to insure its introduction into the bladder.

Fig. 1.

a The bladder.
bb Prostate gland.
c Os pubis.

d The catheter introduced into the urethra, but obstructed at (*g*). The handle of the instrument is depressed so that it comes into the position of (*f*), still the point remains.

e is the position of the catheter when it is drawn up towards the pubes; it is then to be moved directly onwards until it enters the neck of the bladder.

h The scrotum.
i Small intestines.
k Rectum.

Fig. 2. — The Operation of Sounding.

a The bladder.
b — stone.
c — rectum.

d — finger introduced into the rectum, to lift the stone from the lower part of the bladder.

e The scrotum.
f — corpus spongiosum urethræ.
g — corpus cavernosum.
h — sound.
i — small intestines.
k — os pubis.
ll — prostate gland.

INTRODUCTION OF THE MALE CATHETER.

The patient is laid on his back, on a bed or sofa, his head and chest slightly bent, the pelvis placed horizontally, the thighs apart and the limbs semi-flexed. The surgeon, standing at the left side, draws back the prepuce from over the glans penis with the ring and middle fingers of his left hand, their backs looking downwards, he closes them against the middle of the penis, that the foreskin may not reascend.

His fore finger and thumb, placed as high as the frenum, seize it, and embrace the penis without compressing the orifice of the urethra. The penis in this position looks downwards, so as to form an angle of forty-five degrees with the anterior surface of the body. The right hand meanwhile, being semi-pronated, grasps the catheter.

Hunter sometimes found it useful to introduce a very small bougie just before attempting catheterism.

In many instances a flexible elastic gum catheter is better than a silver one. Perhaps in all cases accompanied with spasm and inflammation, and where it is requisite to leave the tube for some time in the urethra, the former should be preferred.

This instrument is held in such a way that the convex surface is turned upwards and the concavity downwards. The thumb and fore finger rest in opposition upon the upper and lower surfaces of the pavilion;

Until the point of the instrument reaches below the arch of the pubis, it may be introduced either with its concavity or its convexity towards the patient's abdomen.

the middle finger is stretched forth under the instrument, which it supports a little in advance of the fore finger. The catheter is presented to the orifice of the urethra in the direction of the linea alba, its concavity looking towards the pubis.

The middle line of the urethra is that in which a catheter will most readily come at the bladder. *J.*

By a harmony of action between both hands, the operator offers the beak of the catheter to the orifice of the urethra, whilst the penis bends gently forwards to receive it, and the instrument is slowly insinuated into the passage. As the right hand approaches the penis to pass the instrument, the left hand draws up the organ to it. The ends of the catheter describe a trajet of an arc of a circle in opposite directions, which follows the medium plane by a sort of a see-saw motion performed at its central point, so that the pavilion rises as the beak descends. When the surgeon has conducted the beak to the arch of the pubis he lets go the penis, and gently and slowly raises the top of the catheter to a perpendicular, without the exercise of the slightest pressure; then raising the instrument for two lines at the utmost, to disentangle the beak from the folds which are caused by a wrinkling of the mucous membrane of the urethra, he, by a movement which describes the fourth of a circle, in an inverse direction to the first position, his hand being thereby placed in a state of pronation which increases by degrees, whilst at the same time he presses gently upon the catheter, lowers its pavilion between the thighs of the patient.

The beak, from the little see-saw motion which is given it, slips along the anterior and upper surface of the urethra beneath the arch of the pubis, and enters the bladder.

The bulb of the urethra being out of the direct course of the urethra, it sometimes happens that the catheter is stopped at that part of the urethra which may generally be got the better of by making the instrument to pass, as it were, along the surface of the pubes.

When the apex of the catheter reaches the neck of the bladder, if it does not easily pass in on depressing the handle, Mr. Sharpe recommends to withdraw it a quarter of an inch, and then to introduce the finger into the rectum to raise it, by which method it will seldom fail to enter.

To remedy the difficulty which is often met with in introducing the elastic gum catheter past the neck of the bladder, withdraw the stylet when the point of the catheter meets with the obstruction, the effects of which is, that the curvature of the instrument is increased, and its point consequently elevated.

INTRODUCTION OF THE STRAIGHT CATHETER.

The operator supports the penis between the thumb and fore finger of the left hand, perpendicularly to the anterior surface of the body; with the right hand he introduces the catheter into the canal, then stretching the penis, slides it directly under the pubis into the bladder without the least difficulty.

Whatever method of performing this operation is pursued. the catheter should be introduced with the greatest gentleness, When any obstruction occurs, the design of the surgeon should be to evade rather than to overcome it. Unsuccessful attempts may render a case extremely difficult which was not so before.

FIXING THE CATHETER IN THE URETHRA.

The common bag truss for the scrotum answers extremely well, first, by fixing two or three rings on each side of it along the side of the scrotum, and with a piece of small tape the ring of the canula can be fastened to any one of those rings that is most convenient for its situation.

Dr. Oke's Plan.—Let a common ivory ring of proper size be passed around the penis, and retained in that situation by three tapes fastened to a band or handkerchief, previously placed around the ilia. Two of the tapes should be carried from the band behind, and tied to the inferior part of the ring, one on each side of the scrotum, and the remaining tape from the band in front, and tied to the superior part of the ring.

To this ring the upper end of the catheter may be readily and securely fixed.

INTRODUCTION OF THE FEMALE CATHETER.

The patient being placed at the side of the bed, the instrument must be introduced under the bed clothes so as not to occasion the smallest exposure. The knees must be drawn up, and the labia separated by the points of the fingers, search for the inferior edge of the symphysis pubis, under which the urethra immediately runs; press this part gently with the point of the finger, and the meatus urinarius will be for the most part readily discovered. When found, keep the extremity of the finger upon it, then with the other hand guide the catheter along it, until it reach the orifice and is introduced into it, press it gently backwards and upwards until it enters the bladder. During pregnancy, the urethra is so much raised against the posterior part of the symphysis pubis that it becomes almost perpendicular, whereby it becomes necessary to use an instrument very much curved, in order to arrive at the urinary bladder. A preference is given to the flat catheter.

HÆMORRHAGE FROM THE URETHRA.

When all remedies fail to suppress the bleeding, a full size bougie or an elastic catheter must be introduced into the urethra; this will frequently stop the discharge; but if it fail, and when it comes from the fore part of the penis, a small bandage may be applied sufficiently firm round the organ. If it comes from the perineal portion of the urethra, pressure must be made with the fingers directly on the part, and continued some time until the hæmorrhage ceases.

OBSTRUCTION IN THE URETHRA FROM EXCRESCENCES.

When situated just in the opening of the urethra, they are to be removed by a ligature, knife, or scissors. When situated low in the canal, the frequent application of the bougie will soon destroy them.

DILATATION OF THE URETHRA.

Introduce a large-sized elastic bougie, well oiled, every day into the bladder, and allow it to remain for several hours, the patient, at the same time, drinking a large quantity of linseed tea, barley-water, or a decoction of parsley stone-break, with a few drops of nitric ether, till the bladder becomes distended, and the patient complains of a violent inclination to pass his water. Let him lean forward, and strain for a few minutes; withdraw the instrument, and the urine will follow in a full stream, and with force that frequently brings with it a small calculus.

In dilating the urethra the bougie at each application should not be allowed to remain in the passage more than a minute or two, till the urethra becomes accustomed to the use of the instrument.

SITUATION, FORM, AND EXTENT OF STRICTURES.

Having oiled a bougie of such a size as the orifice of the urethra will receive, enter it into the urethra with the right hand, while with the left stretch the penis, and pass it gently down until the point stops at the contracted part.

According to Sir E. Home, strictures occur most commonly just behind the bulb of the urethra, at about six and a half or seven inches from the external orifice.

The next most frequent situation is about four inches and a half from the orifice. Strictures are also met with at three inches and a half down the canal, and sometimes almost close to the opening in the glands.

A moderate degree of pressure is then to be made against the stricture, and continued for a short time, but should the instrument not be enabled to pass, it must be marked with the finger nail the depth to which it has penetrated, and withdrawn, and smaller ones employed. The bougie selected should be so large as to enter the stricture with difficulty. This gives an idea of the diameter of the contracted part, when compared with the rest of the canal, and also the exact situation of the stricture. This being accomplished, a soft bougie, with the depth of the stricture marked on it, of the same size with the one which entered the contracted portion, is to be oiled, and passed along the urethra till it reaches the stricture, into which it must be gently forced, and allowed to remain till it becomes soft; on withdrawing it the stricture will be accurately marked on its surface.

DILATATION OF STRICTURES OF THE URETHRA.

The dilatation should not be carried farther than the feelings of the patient will allow.

The bougie should not remain in at first more than one or two minutes every other day, increasing the time a little according to circumstances.

The bougie should be increased in size according to the facility with which the stricture dilates, and the ease with which the patient bears the dilatation. If the parts be very firm or very irritable, the increase of the size of the bougie should be slow, gradually stealing upon the parts, and allowing them to adapt their structure to the increased size.

The French introduce a silver or gum elastic catheter through the stricture, and allow it to remain in the urethra for some days when it is withdrawn, and a larger one employed in its stead

MODE OF APPLYING CAUSTIC TO STRICTURES.

The caustic bougie having the distance of the stricture marked upon it, and being oiled, it is to be passed down to the seat of the affection, and pressed against the stricture for the space of a minute, so as to produce a superficial eschar.

INCISION FOR STRICTURE OF THE URETHRA.

Pass a full-sized catheter down to the obstruction in the uretha; let an assistant hold it firmly, at the same time pressing it gently downwards, so as to make its point project a little above the strictured part. The surgeon then, with a sharp-pointed scalpel, makes an incision, according to the extent of the stricture, through the integuments, urethra, and the obstructed part. As soon as the obstruction is removed, pass the catheter into the bladder.

If you cut into the urethra on the face of the stricture, a common probe can generally be passed through it, and a lachrymal probe always.

As soon as a probe can be passed through, introduce a straight blunt-backed and pointed bistoury by the side of it, with its edge turned towards the pubis; and if there be then not sufficient room, and the parts are hard and cartilaginous from long-continued disease, the bistoury should be turned first with its edge to the right and then to the left, when it cannot fail to do all that is required.

COMPLETE OBSTRUCTION OF A PORTION OF THE URETHRA WITH FISTULA PERINÆI.

A straight grooved staff is to be passed along the urethra, down to the stricture, and kept in this situation by an assistant.

The operator introduces a small common director, somewhat bent to suit the curvature of the passage, into the external orifice of the fistula, carrying it forwards to meet the staff. The points of the instruments are brought as nearly in contact as the stricture will admit. A straight bistoury is pushed along the director, dividing, in its course, the fistulous tube and diseased portion of the urethra. An elastic catheter is passed into the bladder, and allowed to remain.

Case of complete Obstruction of the membranous Portion of the Urethra. — The patient being placed in a convenient position, with his thighs flexed upon the pelvis, a silver catheter was passed down to the obstacle in the urethra, where it was held firmly by an assistant, in such a manner as to make its extremity project a little in the perineum, in order that it might serve as a guide for the knife. An incision was then commenced upon the raphe of the perineum, immediately behind the bulb of the urethra, and conveyed backwards, in the direction of that canal, as near as possible to the verge of the anus.

The skin and integuments being thus divided, a careful dissection down was made upon the end of the catheter, to reach which it was found necessary to divide a part of the bulb. This point gained, and the direction of the natural course of the passage thus ascertained, the dissection was cautiously continued backwards through the indurated tract of the obliterated membranous portion of the urethra, with the object of reaching the open portion of the passage posterior to the obstacle. This was not accomplished until the anterior extremity of the prostate gland was reached, where, after some little impediment, the point of the catheter was insinuated into the canal, and conveyed into the bladder.

URINARY FISTULÆ.

Introduce along the natural passage a staff, which is carried into the bladder, then pass into the fistulous opening a common director, and lay each sinus open with a straight bistoury, through its whole length, till it reaches the urethra. If the sinuses be not sufficiently large to admit the director and bistoury, it will be advisable to dilate them, which is easily done by the introduction of a piece of sponge tent, a few days previous to the operation. After the sinuses have been laid open, withdraw the staff, and introduce the elastic gum catheter, which is allowed to remain till the urethra heals.

PERINEAL FISTULA.

A catheter cut short, with the perforation exactly at its extremity, and not at the sides, must be passed just beyond the site of the stricture, and retained in the penis by tapes. Pads made of lint are to be placed on each side of the urethra, and opening in the perineum, and firmly secured by means of a circular bandage.

MODE OF EXAMINING THE PROSTATE GLAND.

Introduce the finger, previously oiled, into the rectum, place the fore part of it towards the pubis, and if the parts as far as the end of the finger can reach be hard, making an eminence backwards into the rectum, so that the finger is obliged to be removed from side to side to feel the whole extent of such a swelling, and it also appears to go beyond the reach of the finger, we may be certain the gland is considerably enlarged.

Sir E. Home observes, the enlargement of the third lobe often keeps pace with that of the lateral lobes, so that there is no passage either on the one side or the other.

PUNCTURE OF THE BLADDER ABOVE THE PUBIS.

The patient is to be placed reclining backwards, having pillows under his loins, both to throw forward the belly and to keep him from shrinking. Push a sharp straight-pointed scalpel through the skin and integuments, about an inch or an inch and a half above the symphysis pubes, obliquely backwards and downwards, into the distended bladder. A female catheter, or a silver canula, is to be introduced into the opening, and conducted along the blade of the knife, the latter being withdrawn simultaneously with the introduction of the other. The catheter is fixed in its situation by means of tapes attached to its eyes and passed round the body.

Some surgeons prefer passing a curved trocar into the bladder.

The canula must be removed every second or third day and cleansed. Previous to its removal a firm probe or common bougie of sufficient length must be passed through it into the bladder, and kept there until the former is returned, which is easily accomplished by means of the conductor.

PUNCTURE OF THE BLADDER PROM THE PERINEUM.

The patient being placed as for the lateral operation for the stone, an assistant makes firm pressure on the abdomen, above the pubes. The surgeon introduces the index finger of the left hand into the rectum, and presses it back towards the right side of the pelvis, so as to make it as distant as possible from the parts about to be pierced.

The surgeon is then to introduce the trocar at the middle of a line drawn from the tuberosity of the ischium to the raphe of the perineum, two lines more forward than the verge of the anus. He first pushes the instrument according to a line that is parallel to the axis of the body, and directs the point a little forwards. It is not necessary to push the canula so much forward into the bladder as when the puncture is made above the pubis.

Another Method.

The patient being placed in a proper position, an incision is to be made through the skin and integuments in the perineum, as in the operation for the stone, and is to be carried to the bulb of the urethra, where it is covered by the accelerator urinæ. The bulb of the penis is then pushed towards the patient's right side, and the incision carried onwards between the bulb and left crus of the penis as far as the prostate gland. The finger of the surgeon is passed into the wound as far as the left side of the gland, so that it may serve as a guide to the canula and trocar. He then plunges a trocar into the bladder to the left side of the gland. After the urine has been discharged the canula is to have a stopper put in it, and be retained in the opening as long as the circumstances of the case require, the substance used for closing the mouth of the tube being taken out as often as an evacuation of urine is required.

PUNCTURE OF THE BLADDER FROM THE RECTUM.

The patient is placed as for the lateral operation of lithotomy; an assistant presses down the bladder with his left hand, above the pubis, and with the right holds up the scrotum. The operator introduces the index finger of the left hand, oiled, into the rectum, and places the point of it as high as possible upon the middle of the tumour occasioned there by the bladder. A curved trocar, having its point drawn a little back within the canula by the right hand, is to be conducted on the same finger into the rectum, and pushed into the prominent part of the swelling which that finger touches.

Withdraw the trocar and pass an elastic catheter through the canula into the bladder, withdraw the canula and secure the catheter by means of tapes passed between the thighs fastened to the body, or secure the instrument to the T bandage.

PUNCTURING THE BLADDER IN THE FEMALE.

Introduce the fore-finger of the left hand, previously oiled, into the os externum. Convey a trocar upon it to a prominent part of the bladder nearest to the mouth of the vagina, and pierce it.

The canula must be left in the opening, and secured by means of tapes to the T bandage made to pass over both the labia.

IMPERFORATED URETHRA.

Introduce in the direction the urethra ought to take a small trocar, until the urine flows. A piece of elastic catheter may be introduced, so as to keep the wound open.

PHYMOSIS.

Introduce a fine director between the fore-skin and glans, at its under surface.

A sharp-pointed bistoury is to be passed along the director, and the parts are to be divided parallel with the frenum.

If the frenum should be very short it must be divided with the scissors.

PARAPHYMOSIS.

Make an incision about half an inch long with the shoulder of a lancet, or a fine scalpel, on each side of the penis, immediately behind the gland, sufficiently deep to divide the stricture; or, introduce the point of a crooked bistoury, turning the back of it towards the penis, under the folds, one after another, and divide them from within, outwards, laterally.

Another Method.

With the fore-finger and thumb of the left hand press the fold of the prepuce backwards, and with a pair of crooked scissors in the right, snip it to the extent of the eighth of an inch on either side. This will allow the skin to be forced back, so as to expose the inner doubling of the prepuce, which must be divided about a quarter or half an inch, according to circumstances, and in the same direction with the first incision. The prepuce will then be brought over the glans with ease.

CIRCUMCISION.

If the end of the prepuce in children be grown thick or callous, it is better to cut it off.

This is accomplished by drawing the prepuce over the glans, and, with a pair of fine scissors, cutting off the elongated portion.

AN EFFUSION OF URINE IN THE CELLULAR MEMBRANE OF THE PERINEUM, SCROTUM, AND PENIS.

Make a free incision with a scalpel into the parts which are the seat of the extravasation, as soon as the tumour begins.

Thus, an outlet being made for the urine, a stop will be put to its becoming widely diffused in the cellular membrane.

METHOD OF SOUNDING.

The patient being laid on his back upon a table of convenient height, or across a bed, with his shoulders raised upon a pillow, and his thighs properly elevated and extended, a sound adapted to the size of the urethra is to be chosen, and, previous to the introduction, it is to be laid in warm water till it be of the heat of the body, and then wiped and well oiled. The operator takes hold of the penis with the left hand, and with the right passes the sound into the urethra, holding the convex part of it towards the abdomen of the patient. He is now, with his left hand, to draw the penis gently forward upon the instrument, which is to be gradually pushed into the bladder. Sometimes its passage is obstructed by the neck of the bladder, to get over which, instead of using force, the extremity of the sound must be tilted up.

If it should not be forwarded by that direction, withdraw it a little, and pass the fore-finger of the left hand, oiled, into the rectum, by which the end of the instrument may be lifted up, and easily slipped into the bladder. As soon as the instrument enters the bladder, if it happens at once to touch the stone, a tremulous motion will be communicated to the fingers of the operator.

> Apply the stethoscope with the plug removed upon the pubis or posterior part of the sacrum; if the catheter be then introduced into an empty bladder and it contains no calculus, the various movements given to this instrument will produce sounds which resemble those of a pump put in operation.—The steel sound, when introduced into the bladder containing little urine, produces a noise similar to the saliva agitated between the teeth when the mouth is shut. Whenever their exists a calculus, a kind of clicking or slight shock, or rather sounds similar to those afforded by the action of a file on a hard body, are distinctly heard.

If the stone be not soon discovered, the instrument is to be moved in all directions; and should the operator be still unsuccessful, one of the fingers of the left hand is to be introduced into the rectum, so as to raise that part of the bladder in which a stone may probably be concealed.

> As the cavity of the bladder is more depressed in its fundus than the commencement of the canal of the urethra, it is necessary to elevate the handle of the sound considerably, and incline it to the right and left, and in every direction, when we are endeavouring to ascertain the presence of the stone.

If these precautions prove ineffectual, the position of the patient must be changed; he should be sounded, sometimes laid on his back, sometimes on his side; then standing up, inclined forwards, or bent backwards. By these changes of situation, the stone is frequently displaced, and its discovery made more easy.

Baron Heurtelop observes, we sometimes, at the moment of contraction, have the sensation of hard extended cords on which the point of the sound strikes and rebounds, and which gives to the hand a shock sometimes so forcible as to deceive us, and induce us to conclude that we have touched a stone. We know that these vibrating cords are nothing more than columns which exist in certain bladders. If with the end of the sound we examine the part where we experience this species of vibration, we find on each side of the fleshy pillar which produces it, a depression which is sometimes of considerable size, and into which the point of the sound passes. These depressions or cells are necessarily produced by the contraction of these columnar bladders upon the fluid they contain; the mucous membrane adhering closely to the kind of grating which is formed by the fleshy bands composing its muscular coat, dips down where it is not supported, and projects where the muscular fibres are prominent. This, although a natural disposition, is one extremely important to be attended to, in considering the operation of lithotrity; for, when the muscular coat assumes this form in a very powerful manner, the simple depressions or cells become pouches in which the calculi may be lodged, and in which, moreover, the hooks of the forceps of an unskilful, careless, or unpractised operator may become entangled.

POSITION OF THE PATIENT FOR THE OPERATION OF LITHOTOMY.

The patient must be placed upon a firm table; a strong double band is to be fastened with a noose round each of his wrists; he is now to be directed to take hold of his feet with his hands, the palms being applied to the insteps, and the fingers to the soles; then with the ends of the bands his feet and hands are to be tied together in the foregoing position. An assistant standing on each side is to press the patient's knee outwards, while two others standing near the shoulders are to take hold of his arm and hinder him from moving about too much.

LITHOTRITY.

The patient is made to extend his whole length on a couch elevated on a table, with a pillow to raise his breech a little, which is brought near to the edge of the table, and his head resting on another pillow. The operator, standing, places himself between the separated limbs, which gives him the advantage of acting towards the centre of the patient's body, instead of from the side, which to one who is not an adept would be inconvenient. None but those who are exceedingly sensitive or timid will require to be held; but on the first trial of the instrument it will be prudent to have assistants present. To prevent the spasms that might perhaps take place in the bladder, and to obviate that narrowing of its cavity consequent upon the old frequent efforts at micturation and at expelling the stone, it is proper now to inject a little warm water into the viscus (about three ounces), so as to increase its volume without inconveniently distending it; this is done by the means of a catheter and of a syringe adapted to it. The lithontriptor's three portions are then well covered with simple ointment or oil, and placed within one another, and the different supplementary pieces being attached, the saw and forceps are to have their extremities drawn nearly on a level, and are then withdrawn at once, so as to form a very obtuse point to the tube, they are now immoveably secured by turning the two screws towards the button handle. The body of the instrument may be then oiled, but it is better to cover the extremity with a little cerate, which will be both soft and rather tenacious. The instrument is then taken up like a writing pen, and its point being engaged in the orifice of the urethra, it is pushed down gently and steadily at nearly a right angle with the body, as far in the urethra as possible; it must now be kept down a little firmly beneath the arch of the pubis, whilst the handle is depressed sufficiently to make it pass with another gentle impulse into the bladder. Here it should never be allowed to arrive with a sudden jerk, and if during its introduction any obstacle be felt, it is better to withdraw a little, or keep it gently pressing upon the part for a moment. Fortunately, large instruments are not subject to make false passages, and by stretching the urethra they prevent any doubling of the mucous membrane, which so much obstructs the passage of instruments.

The lithontriptor is now in the bladder, and we must have a mark upon the instrument to enable us to calculate that not much more nor much less than nine inches and a half remains in the viscus and its canal before we expand the forceps.

Nine inches for the urethra and outer tube, and about half an inch for the portion formed by the forceps and saw when closed. This distance must be, however, less in a straight than in a crooked instrument, the relation of the first to the second approaching to that of the chord to the arc of a circle.

The latter is effected by relaxing the screws, then pushing forward the saw and forceps tube, and then retracting completely back the borer, which makes the forceps expand still more. The greatest distance between the branches of the forceps being laterally at about five lines from their extremities, it is with this part inclined downwards that we now seek the stone, according to circumstances, advancing, withdrawing, or gently rotating the instrument. When the calculus is not easily taken hold of, we may first try to push it into the fangs of the forceps, by introducing the finger per rectum and raising it; or we may make the patient stand up, the instrument being first shut, and then opened, when he is in the upright posture; by one of these means we are sure to succeed. The stone once encircled, we retract the forceps, whose points, being turned inwards at their extremity, not closing on the part where the stone lies, but being drawn from it towards a centre, cannot wound the coats of the bladder, when properly used.

It is extremely advantageous to raise the pelvis to an angle of 45° in order to seize a round stone, of an inch in diameter with gentleness to the organ, and it is absolutely necessary to do so in order to seize one of from 18 to 24 lines. This elevation is necessary in order to seize flat stones in direct ratio to their size: in order to seize the fragments of a stone with ease, this elevation is very serviceable for collecting them in that part of the organ most distant from the neck, and to seize stones less than an inch in diameter the elevation of the pelvis is unnecessary.

The stone being embraced, holding the body of the instrument firmly with the left hand, we may endeavour, by putting our two first fingers round the outer tube and our thumb upon the button (as we would do to push the piston of a syringe), — we may endeavour to crush the stone at once.

If we do not succeed, we may apply the winch at the extremity of the saw-rod, and by alternately boring a little, and then withdrawing the forceps firmly, and fixing it, we shall reduce the stone. When we judge that there is only a small portion of it that remains between the fangs of the forceps, we may withdraw it with the instrument.

When we think we have done enough for once, in consideration of the patient, we leave the process for the day.

In the present process the stone is always broken, but it is reduced to atoms, and every large portion is pursued and seized with the instrument till its diameter is duly diminished. M. Caviale, after allowing the water first injected to flow away loaded with sand, injects water anew through the silver catheter, which once more comes away with particles of stone.

The annexed table will exhibit at one view the lithotritic means and instruments now employed with reference to their application to the principal varieties of stone:

INSTRUMENTS.	MEANS.	TO BE PREFERRED IN CASES OF
Three-branched forceps and drill	Attrition and pressure.	Small round calculi, consisting chiefly of uric acid or the phosphates.
Ditto	Successive perforations and pressure	Large round calculi of similar composition.
Four-branched forceps with excavator, or concentric saw	Excavation and percussion, or concentric pulverization	Large spherical calculi, chiefly composed of the oxalate of lime.
Shell-breaker	Attrition and pressure	Large flat calculi.
Percussor-sound	Percussion	Soft flat calculi.

DILATATION OF THE BLADDER OF FEMALES.

Introduce Weiss's urethra forceps through the urethra, into the bladder, and ascertain the exact situation of the stone before you separate the blades. As soon as the calculus is detected, the blades are to be opened, and gentle efforts made to seize it. Some practitioners inject the bladder with warm water, through a silver catheter, and ascertain the situation of the calculus with a sound, prior to using the forceps.

The female urethra has been dilated to the extent of one inch and a half without much pain, in ten minutes, by Weiss's dilator.

LATERAL OPERATION FOR LITHOTOMY.

The patient is to be brought to the edge of the table, that the tuberosities of the ischia may project a little beyond it. The anterior superior spinous processes of the ilia are to be as nearly horizontal as possible, and maintained in that position till the operation be completed, while the back, shoulders, and head are to be slightly raised and supported by firm cushions or pillows; the thighs are then to be extended by two assistants, one on each side, who grasp the knees and feet, to prevent the patient approximating them to each other, or to raise his pelvis from the table.

The patient should drink freely of some weak tea or other mild liquor a few hours before the operation, and retain his urine.

The operator now introduces a grooved staff, of proportionable size, through the urethra into the bladder, and having again fully satisfied himself of the existence of a stone, he inclines the staff towards the patient's navel, in order to make the convexity of the instrument prominent in the perinæum, on the left side of the raphe. This being done, he commits the care of it to an assistant, who holds it steadily in the position just mentioned with his right hand, and with his left raises and supports the scrotum.

Scarpa recommends the staff to be held firmly against the arch of the pubis in a line perpendicular to the body of the patient, so that the convex part of it may be placed towards the rectum, and take the exact course of the axis of the neck of the urethra and prostate gland.

The surgeon makes the first incision with a scalpel, the point of which is inserted through the skin at that part of the perinæum which is immediately opposite the lower end of the arch of the pubis; of course the incision begins at the raphe of the perinæum just behind the scrotum. The knife is to be carried steadily in a right line, terminating midway between the lower margin of the anus and the tuberosity of the ischium of the left side.

The first incision should be deeper than it is commonly made, as there is no danger to be dreaded at this stage of the operation, except a wound of the rectum, which is easily avoided.

The incision in an adult should be between three and four inches in length. By two or three successive strokes of the knife the incision is to be deepened and the transversalis perinæi muscles completely divided. When this is done, the groove of the staff is readily felt, and the prostate gland at the bottom of the wound.

A free division of the fibres of the levator ani muscle must be made, before the operator can arrive at the membranous and prostatic portions of the urethra.

Free incisions do no harm, while small ones lead to contusions and lacerations, and inflammation, with fatal results.

The operator now changes his scalpel for a sharp, straight bistoury, the point of which he inserts, with the back towards the rectum, into the membranous part of the urethra. With this instrument he slits up the membranous part of the urethra by cutting in the groove of the staff from the prostate gland to the bulb.

Professor Colles says it is a matter of the greatest importance to the successful, and, indeed, to the safe performance of this operation, that a considerable portion of the membranous part of the urethra should be divided before the staff is depressed, or that the incision commenced by which the prostate and neck of the bladder is divided; for if you have entered the knife high up in the perinæum, and while the point of the knife is lodged there, should depress the staff and attempt the division of the prostate, you will have to make it describe a portion of a circle at a time that it is dividing very resisting parts.

It is of no consequence whether the bulb be cut or not by this incision; it is unnecessary to do it, unless the surgeon should have difficulty in seeing or feeling the groove of the staff; and in that case no danger attends his slitting the urethra freely forwards, always however cutting from the staff, the point of the bistoury being in its groove. The staff is now laid bare to a considerable extent, and is generally invisible, but always readily felt by the surgeon's finger. The knife being laid aside, the beak of the gorget, previously dipped in warm oil, is carefully guided by the finger nail into the groove of the staff. The operator now takes the handle of that instrument into his left hand, and moves the beak in its groove, ascertaining that no membrane or other substance intervenes between the staff and the beak of the gorget. He should be certain also, at this moment, that the staff has not slipped out of the bladder. He passes the gorget with a gentle, steady motion along the groove of the staff into the bladder, depressing the handle of the gorget in such a way that the beak may move along the convex part of the staff nearly at a right angle, and the beak of the gorget will consequently take a direction nearly in a line from the anus to the umbilicus.

The operator must remember the termination of the ureter in the bladder; his incision should extend between this and the vesicula seminalis.

The gorget having fairly entered the bladder, which in general may be known by the immediate discharge of its contents, after which it is instantly withdrawn in the same direction in which it was introduced, and the fore finger of the left hand passed into the bladder and brought in contact with the stone. The staff is now to be removed, and a pair of forceps, adapted to the age and size of the patient, are then to be introduced.

Having passed the forceps into the bladder, the surgeon, before opening them, should sound with them for the stone.

When the situation of the calculus has been thus ascertained, the blades of the forceps are to be separated, and the stone should be carefully taken hold of in its shortest diameter, so that it may occasion as little laceration as possible whilst it is extracted. If the stone cannot be grasped with the straight forceps, a curved pair should be employed. Sometimes the stone is too large to be extracted, and then it is to be broken by means of a strong pair of forceps with a screw in the handles, and the pieces extracted by the forceps; the smaller ones by means of a scoop, and the detached sandy matter is to be washed out by injecting warm distilled water with a syringe into the bladder.

Before taking the patient off the table, the surgeon is to introduce his finger through the wound into the bladder with the utmost gentleness, and assure himself that no calculus matter remains in that organ.

LATERAL OPERATION WITH THE KNIFE AND STRAIGHT STAFF.

An assistant holding the director with the handle somewhat inclined towards the operator, the external incision of the usual extent is made with the knife until the groove is opened, and the point of the knife rests fairly in the director, which can be readily ascertained by the sensation communicated. The point being kept steadily against the groove, the operator with his left hand takes the handle of the director, and lowers it till he feels a check, keeping his right hand fixed, then with an easy simultaneous movement of both hands, the groove of the director and the edge of the knife are to be turned obliquely towards the patient's left side. The knife, having the proper bearing, is now ready for the section of the prostate.

Scarpa advises the incision to be made obliquely downwards and outwards, so as to make with the axis of the neck of the urethra and prostate gland an angle of sixty-nine degrees.

At this time the operator should look to the exact line the director takes, in order to carry the knife safely and slowly along the groove, which may be done without any risk of its slipping out. It may then be either withdrawn along the director, or the parts further dilated, according to the circumstances adverted to. Having delivered the knife to the assistant, the operator takes the staff in his right hand, and passing the fore-finger of his left along the director through the opening in the prostate, withdraws the director, and exchanging it for the forceps, passes the latter upon his finger into the cavity of the bladder. In extracting the calculus, should the aperture in the prostate prove too small, and a great degree of violence be required to make it pass through the opening, it is always advisable to dilate with the knife rather than expose the patient to the inevitable danger consequent upon laceration.

When the staff is withdrawn, the operator can measure the distance of the bladder by feeling its posterior surface and pulling out a little, so that his knife shall clear that surface. He executes the dark and dangerous part of this operation by a clean drawing cut. The same parts are necessarily divided in this method as when the gorget is used.

M. Thomas recommends an incision to be made through the integuments of the perinæum along its external part, and also a section of the lateral part of the body of the bladder, without touching either its neck or the urethra.

LITHOTOMY WITH THE BISTOURIE CACHÉ.

The incision of the external integuments being made as above directed, the membranous part of the urethra is to be opened with the point of the knife laterally, as near to the prostate gland as possible. Through this opening of the urethra the bistourie caché is to be introduced by the groove of the staff into the bladder; as soon as this is effected, that instrument should be disengaged from the staff, which may then be withdrawn. You next place the instrument in such a direction that, when you withdraw it, it may make the wound of the gland on the left side, rather obliquely downwards and outwards, than horizontally lateral. When you have placed your instrument to your mind, incline the handle towards your patient's left thigh, then press on the spring, which will bring out the blade of the knife, that before was concealed in the groove, and withdraw it, observing the obliquity of the handle towards the left thigh during the whole time you are dividing the neck of the bladder. There is great nicety in making this drawing cut, for if the blade of the knife be not placed with some obliquity downwards, it will wound the erector penis and the pudica externa artery; if placed quite perpendicularly, it will wound the vesiculæ seminales and intestine; if you withdraw it in a straight line towards you, the bladder will be wounded beyond its neck.

The operation for the removal of foreign bodies from the bladder, is in all respects similar to that for stone.

M. Boyer says, Take care not to give the blade of the instrument a direction too much outwards whilst it is withdrawn from the bladder, and at the same time to return it into the sheath, when the prostate and neck of the bladder are divided.

THE HIGH OPERATION.

The patient being laid in a horizontal posture with his legs hanging over the table, having his head a little lower than the pelvis, and the pubis shaved, the operator makes an incision through the teguments down to the tendon, in the direction of the linea alba between the pyramidales muscles, beginning at the symphysis pubis, and carrying it upwards for four inches. The tendons of the exterior and interior oblique, as well as the tranversales muscles are divided to the same extent.

The pyramidales muscles are then separated, the abdominal fascia cut through, and the bladder cautiously punctured, and an opening made into it large enough to admit the finger, on which a bistoury is introduced, and the wound enlarged, so as to allow of the calculus being extracted either by the finger or the forceps.

Sir E. Home introduced a silver catheter, open at the end, along the urethra into the bladder, and when the point was felt by the finger in the wound pressing up the fundus, a stylet that had been concealed was forced through the coats of the bladder, and followed by the end of the catheter. The stylet was then withdrawn, and the opening through the fundus of the bladder enlarged towards the pubis by a probe-pointed bistoury sufficiently to admit two fingers, and then the catheter was withdrawn.

In children the bladder is naturally more elongated ; it approximates more to the umbilicus, and does not dive so deep into the pelvis ; hence in them lithotomy above the pubis presents more chances of success than in the adult.

NEW METHOD OF OPERATING FOR THE STONE.

The fore-finger of the left hand of the operator is to be introduced into the anus along with a bistoury, with which he divides that portion of the anterior parietes of the intestine, which is surrounded by the sphincter ani, and the incision is carried forward an inch or more if it be necessary, along the raphe of the perinæum. The finger remains in the wound, and guides the operator in laying bare the membranous part of the urethra. Directed by the staff, the surgeon incises the membranous portion of the urethra through an extent of several lines on the anterior edge of the prostate, when he guides one of the blades of a pair of curved scissors upon the finger into the groove of the staff, and divides the prostate obliquely upwards and outwards on one side; this done, the other blade of the scissors is passed along the staff, and the other side of the prostate divided in the same manner, so that there now results a triangular flap, whose apex points downwards, and which includes a larger or smaller portion of the prostate gland.

The stone is removed with the forceps with the greatest ease.

M. Pinel states, that very extensive wounds of the bladder may be completely and promptly cured by re-uniting the lips by means of sutures.

POSTERIOR OPERATION OF LITHOTOMY.

The speculum ani having been laid in a little warm water for some time previously, and then rubbed with sweet oil, should be gradually introduced into the rectum; the screw should be slowly and steadily turned, by means of which its blades are separated, and the power of the sphincter ani muscle overcome.

The anus thus opened to a sufficient extent (from two to three inches transversely), the index finger of the left hand should be placed on the posterior edge of the prostate gland, which is the anterior boundary of the part of the bladder to be divided. The scalpel is then to be introduced, and by measuring the knife with the index finger the length of the incision can be regulated with accuracy according to our wishes.

The staff, having been previously introduced into the bladder, will be felt pressing the coats of the viscus against the rectum.

This will be an infallible criterion by which we can judge of the situation for the incision, and of the nature of the substance interposed between the staff and the finger. We can then divide the parts either directly on the staff or by its side.

The axis of the pelvis should be carefully attended to, it is a line drawn from the umbilicus to the os coccygis; the incision through the rectum and bladder should correspond to this.

Upon the incision being made, the urine will gush out, and in all probability the stone will be forced out in the same moment. Should the calculus not escape with the urine, the common forceps is to be introduced through the rectum into the bladder, and the stone extracted according to the principles given for the lateral operation.

The bladder can be washed out by means of a syringe with a little tepid water. After which a gum elastic catheter is to be introduced into it through the urethra, and kept in till the adhesive process of inflammation commences so as to unite the divided surfaces. The patient is put to bed, kept lying on his abdomen, till the time above mentioned for removing the catheter.

M. Janson considers that this operation ought not to be performed on children, for in them the rectum is endowed with very great sensibility, which adds very much to the severity of inflammatory action.

LITHOTOMY IN FEMALES.

The patient being placed and secured in the same manner as in the lateral operation, the operator introduces into the meatus urinarius a grooved staff; then by means of a small gorget, with its beak passed along the groove of the staff, lays open the anterior parietes of the urethra, as well as the neck of the bladder, in extent proportioned to the supposed volume of the stone.

He removes the instrument, and introduces the fore-finger of the left hand to feel for the stone and to direct the forceps.

With the Knife.

The patient is placed and held as in the lateral operation. The surgeon introduces a straight staff into the meatus urinarius; the groove being turned obliquely downwards and outwards in a direction parallel to the ramus of the left os pubis. He passes a straight knife upon it, and cuts through the whole extent of the passage and neck of the bladder.

SUB-PUBIC OPERATION.

The patient being properly placed and secured by assistants, the surgeon commences the operation by introducing into the urethra a straight grooved staff, the groove being directed towards the symphysis pubis. With the left hand he depresses the instrument so as to slightly remove the canal from the arch of the pubis. The operator then passes a straight-bladed spear-pointed bistoury along the groove, and divides the superior portion of the urethra and neck of the bladder to a sufficient extent so as to allow the extraction of the calculus.

The instruments removed, the fore-finger of the left hand must be introduced through the wound, and the forceps carefully conducted into the bladder.

Case of Lithotomy between the Bladder and Vagina. — The patient being placed in the ordinary manner, I was unable to reach the upper part of the stone, with the fingers, in the vagina, or to draw it outwards, as I expected to have done. I then passed into the bladder, through the urethra, a staff without any termination of the groove. I passed into the vagina a wooden gorget, used in the operation of fistula in ano, and raised one of these instruments against the other, across the vagina and bladder, in making them form an angle at the height where I intended to finish my incision in the vagina. Entrusting the staff to the assistant, I held in my left hand the gorget, with which, depressing the commissure of the labia, I so exposed the vagina as to see the anterior part retained and fixed by the staff. Then, holding with the hand which was at liberty a straight bistoury, I passed it in the groove of the staff, across the side of the vagina and bladder, which I opened at its neck, behind the urethra, the latter being left untouched. I withdrew the gorget, and passed my finger into the wound, to ascertain the size of the stone. I then returned the staff, introduced the forceps instead of my finger, and brought the stone into the vagina, from whence, with some difficulty, I disengaged it with a curette, in the form of a lever.—*M. Clemot.*

The neck of the bladder and urethra not being surrounded by a voluminous gland, as in man, it follows that this canal is only separated from the vagina by a thin layer of dense and compact cellular tissue, and that we may penetrate with the greatest facility into the bladder by the vulvo-uterine canal.

Desault's Mode of extracting Encysted Stones from the Bladder.

After introducing the finger into the bladder, and ascertaining the part of the stone which is bare in that viscus, we must engage in the slope of the kiotome the kind of collar that is formed by the membranous fold which covers the calculus, and we must cut this fold, by pushing the blade of the instrument into the sheath. If this collar do not project enough, or if it cannot be engaged in the slope of the kiotome, there would be no other inconvenience than that of having to place this slope upon the tumour formed by the stone, and to cut in this place the envelope which fixes it there. The incision is enlarged at pleasure by placing the slope of the sheath more forward, and reiterating the stroke of the blade. It is not always necessary to give this incision an extent proportioned to the size of the calculus; frequently it is sufficient to cut a few lines of the membranous reduplication which embraces the part of the stone corresponding to the bladder, in order to disengage this extraneous body, whatever may be its length.

Besides, the finger may be used instead of the forceps, to turn the stone out of its collar, and then it may be extracted according to the rules prescribed for calculi of the bladder.

The index and middle fingers of the left hand being placed in the rings of the instrument, and the thumb in that of the blade, he introduces it shut into the bladder along the index finger of the left hand; the blade is drawn back enough to leave the slope of the sheath free; he then applies this slope upon the tumour by means of the same finger, and by pushing the blade gently, cuts at once, and without danger, that part of the bladder which covers and retains the stone. This being accomplished, the instrument is withdrawn.

INVERSIO VESICÆ.

Steady the neck of the bladder with the thumb and fore-finger of the left hand, and with a catheter or large elastic gum bougie push the fundus upwards and inwards into its natural situation.

STONE IN THE URETHRA.

Draw the skin of the penis towards the prepuce, taking hold of the penis where the stone is lodged: place the left fore-finger and thumb, one above and the other below the stone, whilst the middle finger, being placed upon the corpus cavernosum, directly upon the stone, fixes it, and makes it press outwards.

In making the attempt to extract extraneous substances from the urethra with the forceps, the first precaution ought to be to avoid the danger of driving it deeper; therefore the finger is to be fixed upon that part of the canal behind which the body lodges, so that in introducing the instrument down to it, and in making the necessary pressure against it in order to grasp it, there may not be the possibility of its escaping farther into the urethra.

The operator makes a longitudinal incision through the integuments, into the urethra, with a scalpel, upon the stone. This done, the stone comes away of itself, or is easily extracted with a scoop or forceps.

A stone fixed in the urethra near its opening, may be readily removed with the point of a probe, or with a fine pair of forceps.

Stone fixed in the Urethra near the Neck of the Bladder.

The patient being placed as directed for lithotomy, the scrotum and penis suspended by an assistant, the surgeon then introduces his fore and middle fingers of the left hand, previously oiled, into the rectum, and presses firmly upon the parts immediately behind the stone. This being done, he makes an incision through the integuments and urethra, and exposes the stone, which is easily taken out with the scoop or forceps.

HERNIA.

By the term Hernia is understood a protrusion of a soft part from any of the three principal cavities of the body in which it was naturally contained.

But as abdominal Herniæ occur more frequently than any other, the term Hernia is in general confined to a tumour formed by the displacement of the viscera contained in that cavity. There is hardly any disease which is more frequent, more diversified in degree, species, and complication, and requiring greater judgment, caution, decision, and experience on the part of the surgeon.

Hernia has been defined a tumour caused by the protrusion of one or more of the viscera from the abdominal cavity into a sac, which sac is formed by the peritoneum, the investing membrane of that cavity covered by the common integuments and sometimes certain fasciæ.

In abdominal Hernia the bowels are generally protruded through what may be called natural openings, and there are also Hernia of the belly, which appear where there is no natural opening; and in these cases there is generally a rupture or separation of the fibres of the muscles which constitute the parietes of the abdomen.

There are several kinds of abdominal Hernia, five of which however are more frequent than the others; viz., the inguinal, the congenital, the femoral, the umbilical, and the ventral.

Inguinal hernia is more frequent in the male than in the female, in 4,060 cases presented to the London Truss Society, all but 34 were in the male; the right side is by far more liable to it than the left, in the proportion of 51 to 34.

I. Hernia through the inguinal canal.

This canal is wider and its apertures are much more distinct in the male than in the female. Its direction, which usually corresponds with that of the crural arch, is also a little more oblique in the former than in the latter.

The common or external inguinal Hernia, as it is called by Hesselbach, commences at the point where the spermatic cord passes under the lower edge of the transversalis muscle, and passing through the inguinal canal, which is two or three inches long, protrudes at the abdominal ring, the opening in the tendon of the external oblique muscle, by which in the male subject the spermatic cord passes outwards, and in the female the round ligament of the uterus.

As the hernia increases in volume, the canal is very much reduced in length, and its obliquity is destroyed; the two rings are so changed as to position, that the openings are placed (one anteriorly, the other posteriorly) nearly opposite to each other.

There are six varieties.

Inguinal Hernia, arrested in its first stage of descent being in the inguinal canal, but not external to the abdominal ring.

Inguinal Hernia (bubonocele), when the bowel just protrudes and lodges in the groin.

Scrotal Hernia (oscheocele), when the bowel descends into the scrotum.

Hernia of the labium pudendi, when the bowels descend through the ring in woman.

A Hernia may be lodged here which has come down by the side of the vagina.

Hernia where the protrusion occurs, not through the whole of the inguinal canal, but more directly through the abdominal ring, after having forced a passage through the aponeurosis of the internal oblique and transversalis muscles near the pubes, within the point where the spermatic cord crosses the epigastric artery. The internal inguinal Hernia of Hesselbach.

Hernia, through the ring and through the spermatic process of the peritoneum, being in contact with the testicle and congenital, or appearing at birth, or at least with the descent of the testicle.

In this hernia, the displaced bowels are situated within the canal, through which the testes pass from the abdomen into the scrotum, which, though commonly obliterated, sometimes remains open during the whole life. Infants of the female sex may be afflicted with hernia congenita, as there is a canal formed by the peritoneum, which passes through the under abdominal aperture, over the round ligaments of the uterus. This canal is about half an inch in length, and terminates in a blind sac at the groin.

II. Hernia, under the crural ligament, viz., Crural or femoral hernia (merocele).

The parts composing this hernia are always protruded under Poupart's ligament, and the tumour is situated in the hollow in front of the pectineus. The parts descend from the abdomen nearly perpendicular on the side of the femoral artery and vein, between these vessels and the os pubis.

Arnaud states, that of twenty women afflicted by crural hernia, nineteen were married women; and it is also stated, not one out of an hundred unmarried females have this form of the disease.

M. Dupuytren says, that femoral hernia is met with in one case out of ten in man, and that in the female inguinal hernia occurs about as frequently.

Crural hernia is a very rare disease in early life.

The length of the crural canal varies and depends upon the height at which the saphena vein opens into the femoral; it measures from six to fifteen lines. Its direction is nearly vertical; it is triangular and wider above than below. In the female it is a little shorter, but generally wider than in the male.

The crural canal is bounded above and in front by the crural arch below and behind, by the pubis on the internal side, by the thin border of the tendon of the external oblique muscle, and on the outer or lateral aspect by the crural vein.

III. Umbilical hernia, (exomphalos, omphalocele). This arises from a protrusion of the intestines through the opening in the linea alba, which is formed in the fœtal state for the passage of the vessels of the umbilical cord.

IV. Herniæ, through any preternatural opening of the muscles of the belly or their tendons, are generally named ventral.

When the hernial sac contains intestines only, the tumour has been called entrocele; when omentum only, epiplocele; and when both omentum and intestine form the contents of the hernia, the term entro-epiplocele is applied.

The terms gastrocele — hepatocele — splenocele — hysterocele — cystocele, are employed when the stomach, liver, spleen, uterus, or bladder of urine form the contents of the hernial tumour.

Besides the common forms of herniæ, there are some less frequent kinds; of which the following are examples.

Thyroideal Hernia. — In the anterior and upper part of the obturator ligament, there is an opening through which the obturator artery, vein, and nerve proceed, and through which, occasionally, a piece of omentum or intestine is protruded, covered with a part of the peritoneum which constitutes the hernial sac.

Pudendal Hernia. — It commences at the side of the vagina and passes into the labium, between the vagina and ischium; it forms an oblong tumour, traceable within the pelvis as far as the os uteri.

Vaginal Hernia. — Protrudes in the space left between the uterus and rectum.

Perineal Hernia. — In men, the parts protrude between the bladder and rectum; in women, between the rectum and vagina.

Ischiatic Hernia. — Passing out of the pelvis at the ischiatic notch.

Phrenic Hernia. — The abdominal viscera passing through preternatural holes in the diaphragm, or through the dilated passage for the œsophagus.

Mesenteric Hernia. — If one of the layers of the

Plate 8.

Fig. 1.

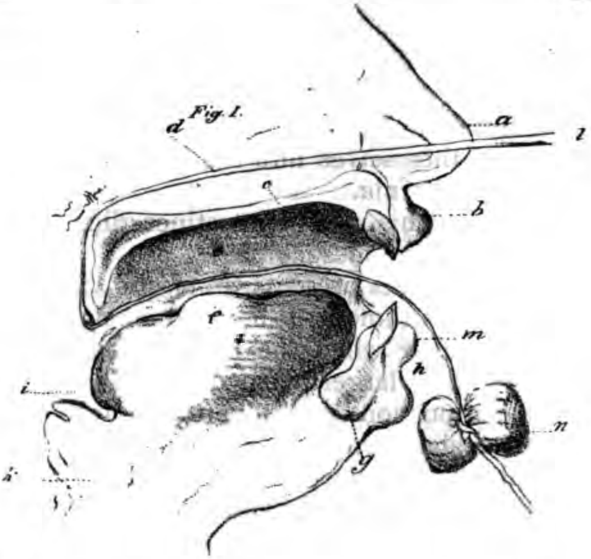


Fig. 3.

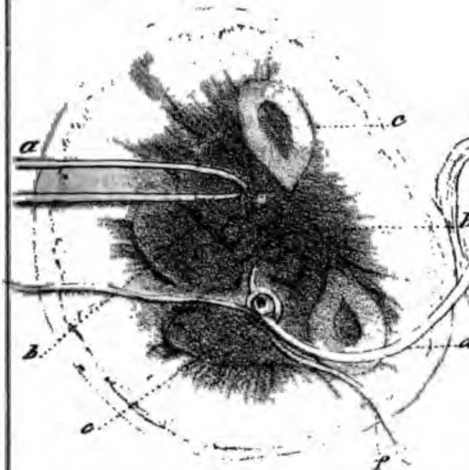


Fig. 4.

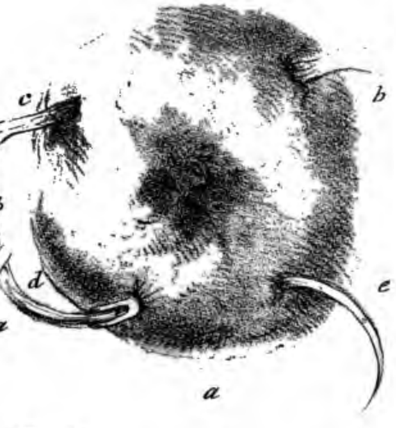


Fig. 5.

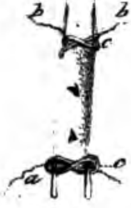
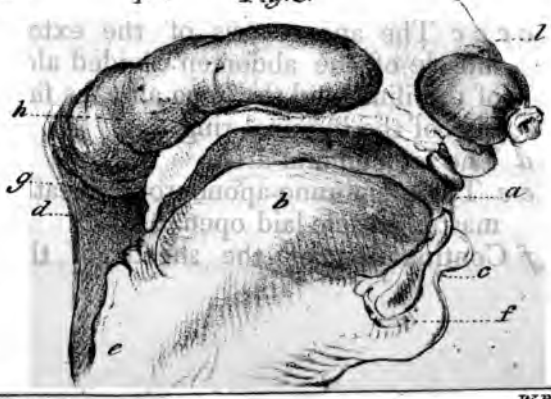


Fig. 2.



E. Schönberg lith: 108, Hatton Garden

W. P. Cooke del.

mesentry be torn by a blow, while the other remains in its natural state, the intestines may insinuate themselves into the aperture, and form a kind of hernia.

Mesocolic Hernia.—The intestines glide between the layers of the mesocolon.

Reducible Hernia presents an elastic, indolent, and colourless tumour, subject to change its size, being smaller when the patient lies down on his back, and larger when he stands up; the protruded portion can be returned into the cavity of the abdomen.

Strangulated Hernia.—The tumour is very tense, painful to the touch, and resisting the impression of the fingers; sickness and vomiting soon follow, and a suppression of all discharge by stool, attended with a frequent hard pulse and febrile heat.

Irreducible Hernia, although unaccompanied with inflammation; the parts cannot be returned into the cavity of the abdomen, in consequence of the adhesions formed with the neighbouring parts.

INGUINAL AND FEMORAL HERNIA.

PLATE VIII.

Fig. 1.—*a a* The left inguinal ring.

b b Intersection of the collateral tendinous bands of the aponeurosis of the external oblique in the vicinity of the inguinal ring.

c c c c The aponeurosis of the external oblique muscle of the abdomen divided along the crest of the ilium and the linea alba, as far as the vicinity of the inguinal ring.

d The left femoral arch.

e e The membrano-aponeurotic sheath of the cremaster muscle laid open.

f Continuation of the sheath of the cremaster muscle, which contains the spermatic cord and the vaginal coat of the testicle.

g g g The fibrous bundles of the cremaster muscle.

h h Soft cellular substance interposed between the sheath of the cremaster and the proper hernial sac.

i i The hernial sac formed by the peritoneum.

k k A portion of omentum protruded and descended into the hernia.

l l The aponeurotic sheath of the rectus muscle of the left side opened and turned back.

m The great sac of the peritoneum, with the intestines shining through it.

o o The left rectus muscle of the abdomen laid bare, and turned very much towards the right side of the abdomen.

p The internal oblique muscle of the abdomen of the left side.

q A portion of the great sac of the peritoneum, which, after dividing the aponeurosis of the fascia-lata, and raising the fallopian ligament, appeared externally under the left femoral arch.

r Common integuments of the scrotum.

1. Femoral artery.

2. Femoral vein.

3. Circumflex iliac artery.

4. Origin of the epigastric artery.

5, 6, 7, 8. Continuation of the left epigastric artery, behind the neck of the hernial sac, towards the rectus abdominis muscle of the same side.

9. The origin of the epigastric vein.

10, 11, 12. Continuation of the epigastric vein behind the neck of the hernial sac towards the rectus abdominis muscle.

13. The saphena vein.

14. Anterior crural nerve.

A. Glutæus maximus muscle.

B. The tensor vaginæ femoris.

C. The aponeurotic sheath of the thigh.

D. The sartorius muscle.
E. The rectus muscle of the thigh.
F. The vastus externus.
G. The iliacus internus.
H. The tendinous origin of the adductor muscles of the thigh.
I. The gracilis.

Fig. 2.—*a a* Femoral arch.
b Part of the aponeurosis of the fascia-lata left adhering to the margin of the fallopian ligament.
c c c Aponeurosis of the external oblique muscle.
d The inguinal ring.
e The spermatic cord.
f f Bundles of fleshy fibres of the cremaster muscle.
g g The hernial sac formed by the peritoneum. A femoral hernia.
h h The external cellular coat of the peritoneum, which, together with the inguinal glands and the aponeurosis of the fascia-lata, covered the hernial sac.
i The loop of ilium protruded.
k The external oblique muscle.
l l An incision made through the fibres of the internal oblique and of the aponeurosis of the transverse, in order to expose the course of the epigastric artery, resting on the great sac of the peritoneum, and running towards the rectus muscle.
m m Division of the aponeurotic sheath of the rectus.
n The external edge of the rectus muscle laid bare, and a little turned back.
o o The aponeurotic sheath of the rectus muscle.
p The iliacus internus muscle.
q Part of the external oblique muscle.
1. The femoral artery.
2. The femoral vein.
3. The saphena vein.

4. The epigastric artery.
5, 6, 7. Continuation of the epigastric artery.
8. The abdominal or circumflex iliac artery.
9. The spermatic artery.
10. A small branch of the spermatic artery. The spermatic vessels are represented in this figure raised by a hook. It is, however, quite evident that if these vessels had been left to themselves, they would descend, as in their natural situation, to the vicinity of the edge of the fallopian ligament.
11, 12. The continuation of the spermatic artery.
13, 14. The spermatic vein divided into several branches.
15, 16. The vas deferens.
17. The anterior crural nerve.
18. The place where the spermatic artery is at the greatest distance from the edge of the fallopian ligament.

OPERATION OF THE TAXIS.

The patient should lie down upon his back, and in case of inguinal or femoral hernia, the pelvis ought to be more elevated than the shoulders, the thorax somewhat raised, the thigh bent and turned inwards so as to relax the tendinous and muscular parietes of the abdomen, and the bladder should be previously emptied. The pressure to be made upon the tumour by the hands of the surgeon is to be gentle at first, then gradually increased, but never so much as to produce pain. The parts are not to be pressed in a mass against the aperture from which they have escaped, but while the tumour is held in one hand, the fore and middle fingers of the other are to be applied about its neck, so that by kneading, the progress of parts may be facilitated through the opening. Sometimes, when the intestine is down and much inflated, a general pressure on the whole tumour by both hands will occasionally be followed by quick success, in which case the air will be heard to go up with a gurgling noise, when the remainder of the tumour may be returned without much difficulty.

Keep the course of the neck of the tumour in view, whilst the reduction is going on. Thus the surgeon will not be satisfied when he has returned the oblique inguinal hernia merely beyond the situation of the external abdominal ring, but will have had his attention directed during the time occupied by the taxis, to assist the parts through the whole course of the oblique canal.

> In employing the taxis for the reduction of an inguinal hernia, the direction of the canal must be borne in mind, in order that the pressure may be employed in the direction of the axis of the canal, obliquely from below upwards, and within outwards.

In Femoral Hernia, it is necessary to remember the direction it takes after the escape of the gut from the abdomen; as it protrudes it tilts upwards, and becomes seated upon the tendon of the external oblique muscle over the inguinal canal, and that it is to be expected to be found in this situation before it becomes strangulated. On the attempt to reduce it by the taxis, therefore, the tumour must first be bent downwards by the thumb and two fingers, with a gradual and steady pressure, until the swelling has got below the line of Poupart's ligament. It is afterwards to be pressed inwards against the upper part of the thigh, and then upwards, that it may have passage under the femoral arch.

In Ventral Hernia, the pressure should be made a little upwards as well as inwards.

In Umbilical Hernia, the pressure must be made as above.

In Pudendal Hernia, the parts are generally reduced by pressing them with a gentle and regular force against the inner side of the ischium.

Vaginal Hernia readily recedes by making gentle pressure on the tumour with the finger.

In Thyroideal Hernia, the thighs ought to be bent very much and separated from each other, and the lumbar region raised by means of pillows placed under the hips; then by gentle and alternate pressure of the fingers, directed obliquely from below upwards, the protruded parts are returned into the abdomen.

In Cystic Hernia, the pressure must be made with the fingers from the vagina in a direction obliquely upwards and backwards.

The efforts may be continued about half an hour, but no violence ought on any account to be used, as it will tend greatly to aggravate the inflammation; and when the pressure becomes painful it should be discontinued.

Should the taxis fail of success, the patient must be placed in an erect position, and blood abstracted from a large orifice so as to produce syncope; during this state, another trial is to be made; and on failure of this also, the warm bath (110°) must be employed, and the taxis repeated while the patient lies in the bath.

Cold applications to the tumour, as pounded ice in a bladder, or a mixture of equal parts of nitre and sal ammoniac in the proportion of ten ounces to a pint of water, have proved successful in several severe and obstinate cases.

If all the above remedies prove abortive, the tobacco clyster must be administered; it is made by infusing one drachm of tobacco for ten or fifteen minutes in a pint of boiling water; as soon as sufficiently cold, inject one half, and the remainder, if it excites no violent deleterious effects, in 20 or 30 minutes after.

When every attempt at reduction fails, and all the symptoms of incarceration continue undiminished, the only chance of relief is the operation.

Mr. Lawrence says, the surgeon should place himself in a situation which he can occupy without inconvenience for a considerable time, since he must persist in his attempts for an hour, in some cases, before he gives up the expectation of success; and it often happens, that by perseverance in trying various positions and modes of pressure, herniæ are ultimately replaced, which did not yield at all to the first attempts.

OPERATION FOR INGUINAL HERNIA.

The patient is to be laid horizontally on a table, with a pillow under his shoulders, his thighs being raised and held asunder by assistants, while his legs hang over the edge of the table.

The parts being shaved, the operator sits before him, and grasping the tumour with his left hand, makes an incision with a scalpel through the skin and integuments, beginning an inch from the abdominal ring, in the direction of the fibres of the external oblique muscle, and extending nearly, or in small herniæ, quite to the bottom of the tumour.

The incision of the integuments ought to be made in the centre of the tumour; for if the lateral and inferior parts be divided, the spermatic artery, which is sometimes alone, at others united to the vas deferens, may be wounded.

The external pubic branch of the femoral artery is generally divided by this incision, and when the hæmorrhage is at all considerable, the vessel ought to be immediately tied. Directly under the integuments lies the superficial fascia; this must be divided by successive touches of the knife, until the cremaster muscle appears, the fibres of which are to be elevated carefully by the dissecting forceps and cut through.

Sometimes the cremaster forms close adhesions with the edges of the inguinal ring in old herniæ, and great difficulty is then experienced in the introduction of a director between its fibres and the edge of the ring.

As fluid is often lodged at the bottom of the sac, this situation is deemed the safest for making the opening. The above kind of dissection should obviously be carried on only at one point till the sac is exposed, when a portion ought to be pinched up with the forceps and divided with the knife, the edge of which should be inclined horizontally.

A small opening having been made in the sac, a director is to be introduced, by means of which and a curved bistoury it is to be slit open up to the ring.

The sac being opened, and the parts contained in it exposed, if the intestine is sound, the operator should first try to reduce by the taxis.

This is accomplished by gently pulling out a sound portion of the gut, so as to facilitate the passage of the matter contained in the strangulated part, and the retention of which is often the sole cause which prevents its reduction.

However, rather than use the least violence, the operator ought always in this necessity to make use of the knife.

He should gently carry the forefinger of the left hand upwards, between the sac and protruded parts, and search for the stricture, which will be found either at the edge of the external ring, which is situated at the spinous process of the pubis, or the internal ring, which is placed midway between the spinous process of the bone and the superior spinous process of the ilium, at the distance of an inch and a half from it, and above a line which is drawn from the top of the external opening horizontally outwards, or the mouth of the sac.

A director is then to be passed under the stricture, which is to be divided directly upwards.

The incision of the tendon should be made at the middle of the superior margin of the ring.

The eighth or sixteenth part of an inch in extent will be often sufficient to liberate the parts with the bistoury recommended by Sir A. Cooper.

If the spermatic cord be situated in front of the sac, the surgeon must carefully ascertain whether it be placed in front of the inner or outer side of the tumour, for in the former case the epigastric artery corresponds to the inner side, and the latter to the outer side of the hernia.

Chopart and Desault recommend the incision to be made upwards and outwards, if the cord is behind the sac, or on its internal side; or upwards and inwards when it is placed to the outer side of the tumour.

Boyer divides the superior and external angle of the ring, whenever the hernia is placed in front of the cord.

Scarpa divides the stricture parallel to the linea alba.

The last step of the operation consists in replacing the prolapsed portion. To facilitate this object, the limb is to be bent so as to relax the abdominal muscles on the side affected as much as possible, and then with the fore-finger of the right hand, return the protruded portion of omentum or intestine nearest the abdomen, retain it till a second portion has been returned, and by a succession of attempts, the whole mass can, with a little patience and skill, be returned into the cavity of the abdomen.

The return of the parts should always be made, unless they are decidedly gangrenous. A dark brown or a chocolate colour of the intestine does not evince that it is actually mortified; the blood in its veins may still be urged forwards by pressure. In gangrene the part is quite black, and gives way under the finger.

If gangrenous spots appear on the intestine, they should be included in a fine ligature before returning them into the abdomen.

If the omentum be in an indurated state, and form too large a mass to be returned through the ring, a portion of it should be cut off near the mouth of the sac, and all the bleeding vessels secured with very fine silken ligatures, and when the hæmorrhage ceases it is to be returned.

Mr. J. Bell states, as soon as we open the sac, we can prognosticate the fate of our patient: if the intestine be inflamed, he is not safe; if it be dark-coloured or livid, he is in imminent danger; if it be of a sound and natural colour, he is in some degree safe.

Mr. Hay says, I have performed the operation (when his work went to press) 35 times, and have often had occasion to lament that I had performed it too late, but never that I had performed it too soon. There are some cases so urgent, that it is not advisable to lose any time in the trial of means to produce a reduction. The delay of a few hours may cut off all hopes of success, when a speedy operation might have saved the life of the patient.

Dr. Ballengall states, I have now performed (1828) in all thirteen times for strangulated hernia, without having once been able to recognize in practice the various fasciæ, with which I was formerly so familiar, and without having once felt or wounded either the epigastric or obturator artery.

As soon as the parts are returned, the edges of the wound are to be brought together, and retained by adhesive straps and the T bandage.

When the Hernia has not passed the Ring.

The operation consists in making an incision through the tendon of the external oblique muscle, opening the sac, and dividing the edge of the transverse and internal oblique muscles upward.

OPERATION FOR INGUINAL HERNIA WITHOUT OPENING THE SAC.

Having exposed the abdominal ring, and the portion of the tendon forming it, according to the directions given in the preceding operation, a small hole should be scratched through the tendon half an inch from the ring, in a direction upwards and outwards towards the spine of the ilium; a director should be passed through this hole, under the tendon, and out at the ring; when this is done, a bistoury or scalpel should be passed along the groove of the director, so as to divide the tendon. If the stricture have been caused by the abdominal ring, it will in this manner be removed, and the protruded parts can be easily returned into the abdomen. If the stricture be seated higher up than the ring, and the parts can be pushed up without violence by the finger, it ought now to be done without opening the sac.

LARGE HERNIA.

The operator makes an incision of two or three inches in length through the integuments over the abdominal ring: he then continues to dissect cautiously down to the fascia, which covers the hernial sac. A small opening is made into the fascia; through this opening a grooved director is passed gently under the tendon; a probe-pointed bistoury is now to be introduced on the groove of the director to the strictured part, and divided. If much difficulty should be experienced in accomplishing this object, a small opening may be made into the sac near the ring, which will enable the operator to divide the tendon. When the parts are thus set free, they should be returned into the abdomen by pressure on the swelling, if adhesions do not prevent this; at all events, they generally admit of being replaced in part.

INGUINAL HERNIA IN THE FEMALE.

This operation is to proceed in the same manner as in the male; but the same coverings to the hernial sac are not to be met with. After the tumour has escaped the external abdominal ring, and becomes placed in the labium pudendum, the operation must be entered upon with great care, as the coverings of the tumour are few and very slightly thickened. The incision will be commenced against the ring and carried along the labium to the extent of the swelling, which will divide the common integuments and expose the peritoneal sac covered by the process of superficial fascia sent from the external ring. This must also be carefully opened, as directed in the previous description; the sac will then be entered into with a probe-pointed bistoury and a director, as before advised.

The division of the stricture will be effected in the same manner as in the male.

CONGENITAL HERNIA.

Let the hernia be of what size it may, the sac should be divided only so far as the upper end of the testicle; but if adhesions exist, the incision must extend lower.

Wilmer states that of five congenital herniæ on which he operated, three were strangulated by the neck of the hernial sac, and not by the inguinal canal.

The truss ought never to be applied to infants, unless the testicle can be felt in the scrotum after the contents of the hernia are reduced.

A congenital hernia may be distinguished in an adult, by an evident external mark, which is, that the bowels push down between the sac and the fore part and sides of the testicle, so as often in a great measure to conceal it, whereas in common hernia every part of the testicle can be felt distinctly.

Femoral Hernia.

The patient being placed upon a table, with the legs hanging over the edge, and the hair removed from the groin and pubis, an incision is to be made through the integuments over the middle of the tumour, extending from one side to the other, parallel to Poupart's ligament. A second incision is to be made nearly at right angles with the first, the two representing the letter T inverted.

The two triangular flaps of integuments are next carefully dissected back, and the superficial fascia being exposed, it must be slit up. The fascia propria, or fore part of the femoral sheath, being exposed, must also be divided; between it and the sac more or less adipose substance will be found. If the hernia be recent, no other fascia than the superficialis will be met with; but if it has existed for some time, another will be found in the condensed cellular membrane which has been pushed down before the true sac, and which it embraces on all sides, forming a complete pouch to the tumour. This is the fascia propria of *Sir A. Cooper*, and the proper cellular envelope of the herniary sac of *Scarpa*, and the outer or false sac of *Sir C. Bell.* The sac is next to be opened in the most cautious manner possible, as the tumour is very tense, and generally filled altogether with intestine, there being seldom omentum within a femoral hernial sac.

Pinch up a small portion of the sac with the finger and thumb of the left hand, or with a pair of dissecting forceps, carefully excluding any portion of the contents of the sac; and then, placing the blade of a scalpel horizontally, cautiously make a small cut into the elevated part, forming an opening of sufficient size to allow of the passage of a director, upon which divide the anterior part of the sac upwards and downwards. To ascertain the seat of the stricture, the fore-finger of the left hand is to be passed into the hernial sac to the point at which it becomes constricted, which is generally found at the posterior edge of the crural arch, just where the intestines leave the abdomen. The seat of stricture being ascertained, a grooved director is to be introduced, and, by means of a probe-pointed bistoury, it is to be divided upwards and inwards.

Sir A. Cooper advises an incision to be made through the aponeurosis of the external oblique above, and parallel to Poupart's ligament, drawing the spermatic cord inwards and backwards, with a bent probe, and afterwards passing a grooved director behind and below the crural ligament, in order that the bistoury may be more safely introduced upon it.

Sir C. Bell divides the stricture by raising the bistoury upon the director, like a lever, cutting it directly upwards.

Sharp cut the stricture outwards and upwards towards the flank.—*Dupuytren* performs the section of the stricture in a similar way, but with a bistoury with a convex cutting edge.

Monroe, sen. and *Sabatier* divided the stricture in the direction of a line, which would terminate at the umbilicus.

Under gentle pressure the parts will readily return into the abdomen. The flaps of integuments must be carefully brought together, and retained by means of a suture and adhesive straps.

According to *Scarpa, Boyer,* and *Gimbernat,* Poupart's ligament should be divided as near its attachment to the pubes as possible, by carrying the knife from without inwards. The size of the crural ring may thus be increased about half an inch without fear of wounding the round ligament, spermatic cord, or the epigastric artery.

It is a certain fact, that in the femoral hernia, contrary to what takes places in the inguinal, the return of the disease always produces a tumour, which in a short time acquires a larger size than it had at first, and as broad at its upper part and neck as at its base, situated transversely in the bend of the thigh, which increases the difficulty of retaining the parts in their place. On this account, the prudent precaution of making all those patients wear a truss who have undergone the operation for hernia, ought never to be neglected, and more particularly after the cure of the incarcerated femoral hernia.

Sir A. Cooper, after mentioning instances of the fatal effects of postponing the operation, adds, "So strongly am I impressed with this belief, that if I were myself the subject of crural hernia, I should only try the effect of tobacco clysters, and if they did not succeed, I would have the operation performed in twelve hours from the accession of the symptoms."

Umbilical Hernia in the Adult.

A semicircular incision of the integuments is to be made on the outer side of the root of the umbilical hernia; then carefully dividing the aponeurotic fascia covering it, the point of a probe is passed at pleasure between the neck of the hernial sac and the aponeurotic edge of the umbilicus, which is to be divided more or less, as the case may require. If it be not possible in any way but by extreme violence to insinuate the point of a probe between the neck of the sac and the aponeurotic aperture, the surgeon will pass the point of the nail of the fore-finger of his left hand between the limits of the neck of the sac and the aponeurosis, and with his hand unsupported will divide the aponeurosis without touching the neck of the sac. After this there will be reason to hope that it may be possible to return into the abdomen at least that portion of intestine or omentum which has recently protruded and enlarged the tumour and increased the symptoms of strangulation; or if none of the viscera protruded for a long time without the abdomen, and adhering to each other or to the sac, can be reduced, the division of the aponeurotic ring of the umbilicus will facilitate the descent and progress of the feculent matter in the tumour. If this should fail, the surgeon must open the neck of the hernial sac at the same place at which he has divided the umbilical ring, and in the same direction.

The surgeon should remember, in performing this operation, that the coverings of the hernia are often very thin, and that the integuments and sac are generally inseparably consolidated on the front of the swelling.

If the hernia be not very large, Sir A. Cooper advises to operate as follows: Make an incision perpendicularly downwards through the integuments terminating on the middle of the tumour; next a transverse incision crossing the tumour at right angles with the former, so as to join its lower end, thus ⊥.

Dr. Physic's Plan.—Make a crucial incision through the integuments of the tumour, and dissect the four angles thus formed down to the neck of the sac; an opening is then made into it at its upper part, of a sufficient size to afford a view of its contents; should these be sound, they are to be reduced, if practicable, without dilating the umbilical aperture; but if this cannot be done, that aperture is to be enlarged outside of the sac, taking care not to wound the neck of the sac. When the contents of it are reduced, a ligature is to be tied round its neck.

Umbilical Hernia in Infants.

The child upon whom the operation is to be performed must be laid on his back, with the thighs a little bent and the head inclined upon the breast. The surgeon reduces the parts that have escaped through the opening and form the tumour, restrains them with the finger, raises up the sides of the hernial sac, and makes them slip between his fingers to ascertain that no part remains in the sac. Certain that the parts which he raises up are only the skin and sac, he directs an assistant to make several circular turns round their base with a waxed linen thread, of a moderate size, fixed at each turn by a double knot, and tied in such a manner as to occasion only inconsiderable pain. The tumour thus tied is enveloped in a bed of lint, sustained by one or two compresses, that are secured by circular turns, which are themselves fixed by a scapulary. A slight swelling of the strangulated parts commonly appears the next day, in the same manner as a polypus swells whose base is tied. The next day after, or the third day, the parts wither, and then the ligature becomes relaxed; a new one must be placed in the same manner as the first, and with the precaution of making it a little tighter.

The sensibility of the parts, increased by the inflammation which the constriction of the thread had already produced there, commonly renders this second ligature more painful; the dressing to be the same as for the operation. In a little time the tumour becomes dull, livid, and withers. A third ligature, applied in the same manner as the others, intercepts its circulation entirely. It becomes black, decays, and commonly falls on the eighth or tenth day.

Ventral Hernia.

The patient being properly secured, the operator makes a transverse incision across the middle of the tumour, a second commences from the middle of the transverse incision, and is carried to the lower part of it; the flaps thus formed are turned back, and the seat of stricture divided above and below.

If the hernia be at the lower part of the linea semilunaris divide upwards, as the epigastric artery lies contiguous.

ARTIFICIAL ANUS.

Having discovered the lower orifice of the bowel, the patient is placed upon his back, and one of the blades of the enterotome is introduced upon the index finger into one of the orifices to the depth of one, two, or three inches, according to the nature of the case. This blade is then given to an assistant, and the other introduced in the same manner into the other extremity of the gut, when they are joined together like common forceps, by putting the tenon of the one into the mortice of the other. The partition of the gut is then inclosed within the blades, and as their action should be slow and gradual, it is regulated by the screw. As soon as the forceps are removed, the edges of the external wound are to be pared off and brought together by means of the interrupted suture and adhesive plaster; over this must be applied a compress and the T bandage.

The pressure should be increased every other day, by giving the screw a turn or two. After each operation the patient must be narrowly watched, and if any untoward symptoms come on, they must be promptly cut short by a strict attention to the antiphlogistic remedies.

The instrument will fall off generally between the seventh and fourteenth day.

Another Method. — *Case.* — A crooked needle, armed with a ligature, was passed for some distance within the orifice of one gut and brought out at the other, traversing in its passage the coats of each. The ends of the ligature were then tied at the external opening and formed a loose loop. This, being suffered to remain for a week, caused the sides of the two intestines to adhere to each other. Through the consolidated ridge thus formed an incision was afterwards made, a direct communication established between the upper and lower intestines, and the external orifice closed, when a perfect cure soon followed.

WOUNDS OF THE INTESTINES.

Let a small sewing needle, armed with a silk thread, be passed near to the lines formed at the base of the everted lips.

The thread is to be carried, at short regular distances, through the whole extent of the wound, the operator being mindful that an equal portion of the edges is included in each stitch. When the suture is finished let the thread be securely fastened and cut close to the knot. The reduction of the prolapsed fold should then be conducted with the nicest caution, and when completed the wound of the integuments should be treated with a stitch, a plaster, or a poultice, as circumstances dictate.

Another Method.

A small stitch, including only the peritoneal coat of the intestine, is to be taken up on one side of the wound, at the distance of a line or two from its edge; the needle is then carried across the wound, and a similar stitch taken up on the opposite side, at the same distance from its edge; this way a number of ligatures are introduced at the distance of a quarter or half an inch from each other, and when these come to be tied the wound is completely closed, the serous surfaces of the peritoneal coat on either side of the incision are brought into contact, and the lips of the wound are left projecting into the intestinal tube.

M. Joubert recommends the lips of the wounded intestine to be folded inwards, previous to passing the threads through them.

Mr. J. Bell says, if it should happen that a gut is cut fairly across in all its circle, which it is not impossible it may be by a stab with a knife or broad sword, the two ends of it may be made to adhere to each other; and the prudent way of favouring these adhesions is to introduce the one piece of intestine a little way within the other, and make one single small stitch in that part of the circle which is farthest from the mesentery, and then draw the gut by means of that thread close up to the wound; and thus it will probably happen, that the mesentery will keep its side of the circle firm, and that the stitch will keep the opposite side firm; that the gut being drawn by the thread and pushed from behind, and flattened by the universal pressure within the abdomen, the double adhesion may take place, viz., of the surfaces of the intestine to each other, and of the wound of the intestine to that part of the inner surface of the belly where it is open and inflamed by the outward wound.

Sir A. Cooper tied up an opening in a gut by passing a ligature around it, in the manner we encircle the mouth of a bag, and cut off the ends of the ligature close to the knot: the patient recovered without a bad symptom.

HYDROCELE.

The tumour must be embraced with the left hand, and the incision made with the scalpel from the superior part of the tumour and continued downwards its whole length, quite to its bottom, through the skin and adipose membrane.

The tunica vaginalis being thus exposed, a puncture with a lancet should be made at its upper part, and the finger of the left hand be introduced, when with the blunt-pointed bistoury it is laid open to the bottom. If the hydrocele should affect both sides of the scrotum, gentle pressure must be made on the opposite side so as to push the septum scroti into the opened vaginal sac. An opening is then made with a lancet at the upper part of it so as to admit the operator's fingers, on which a bistoury is carried and the septum freely divided to the very bottom.

Dr. Monroe has found that the most successful time for performing this operation is very soon after the palliative method has been once executed before it begins to increase again; in this stage the extent of surface exposed to inflame is much less, and the danger attending the operation considerably lessened.

By Seton.

Discharge the contents of the swelling by means of a common trocar in the usual way; the scrotum and loose tunica vaginalis are to be firmly held between the fingers and thumb of the left hand of the operator, close to the testicle. This being done, an assistant holds one side of the skin in the same manner as in making a common seton. The operator having a straight suture needle, armed with a common ligature, passes it through the skin and tunica vaginalis in an oblique direction. The ends of the ligatures are to be tied loosely.

Excision of a Portion of the Tunica Vaginalis.

Puncture the hydrocele with a broad lancet, and after discharging its contents, draw forward the edge of the tunica, and with a pair of scissors remove a small portion of it.

ENCYSTED HYDROCELE OF THE SPERMATIC CORD.

The operator grasps the integuments and spermatic cord in his left hand, at the posterior part of the tumour, till he makes it project, and draws the skin tight over it. He then divides the skin and layers of fascia longitudinally by repeated gentle strokes of the knife till he arrives at the cyst, which is generally quite transparent. The projection of the cyst increases as the parts which cover it are divided, and when it is laid bare almost the whole of it is exposed. The cyst is then punctured with a lancet, and all that appeared perfectly transparent before the puncture must be cut off with the knife or scissors, but the posterior part of the cyst must be left untouched.

The integuments are to be united by a suture and adhesive straps, and supported with the T bandage.

IMPERFORATE ANUS.

The infant being placed over the knee of a nurse, and the nates exposed, the surgeon makes an incision cautiously in the natural direction of the anus, about one inch and a half in length, through the skin and cellular substance. If no meconium appears, the finger is to be passed into the wound, in search of the rectum, and a trocar is to be carefully directed up to the termination of the gut, upon the point of the finger. The greatest caution is necessary to keep the opening made into the rectum open by dossils of lint, of proportionate thickness, and sufficient length.

Mr. Hutchinson advises (after the child is about a month old) the removal of whatever instrument is used during the night, and to keep it in its place only through the day.

Warts within the Verge of the Anus.

With a pair of common dressing forceps lay hold of the wart and draw it gently forward, and with a pair of round-pointed straight-bladed scissors cut it off. Lint dipped in spirits of turpentine, and applied to the part, will stop the bleeding.

PROLAPSUS ANI.

The patient, being placed on a bed, is to lie upon his face, with the buttock elevated; the surgeon should force up the protruded end with one hand, whilst he presses in that part which is next the anus with the fingers of the other. This will never fail to prove successful, unless the gut happens to be inflamed and swelled by long exposure. When this is the case, we must order fomentations, and employ antiphlogistic measures.

In children it is difficult to reduce the last turns if the finger be pushed through the orifice; for when it is again withdrawn the gut slips down. To prevent this, twist a piece of stiff paper into the form of a cone, soften the point by wetting it with oil, and placing this upon the point of the finger, push the last portion of the gut within the anus. The cone will slip out easily, without bringing down the gut.

PROLAPSUS OF THE RECTUM FROM RELAXATION.

The patient lies on the belly; the upper part of the trunk and head is low; the pelvis, on the contrary, much elevated by pillows. The thighs and buttocks are separated by an assistant, to expose fully the margin of the anus and the anus itself. The operator, holding in his left hand a pair of dissecting forceps with large blades, seizes successively, from right to left, and even from before and behind, two, three, four, five, or six of the folds of skin surrounding the margin of the anus, and with a pair of curved scissors, held flat with the right hand he cuts off each fold as soon as it is raised.

If moderate, it is sufficient to remove two or three folds on each side; if very great, a greater number must be cut off.

The excision should be prolonged as far as and even within the anus, as the action extends even above the opening. If the relaxation be considerable, the incision may be carried to half an inch in length, but in general a few lines are sufficient.

Mr. Mayo operated on a young lady who laboured under prolapsus; it was about the size of an orange, the coats of the bowels not at all thickened, and the sphincter extremely relaxed. Operation.— A small fold of intestine was pinched up with forceps and tied with a silk ligature; care was taken to include the mucous and submucous coats alone in the ligature. The whole surface included was less than that of a sixpence. Before finally tightening the ligature the surface of the little fold was cut off with scissors. Three such folds were tied upon opposite aspects of the bowel, and at different distances from the sphincter; the parts were then replaced.

HÆMORRHOIDAL TUMOURS.

The patient is placed in a reclining posture on a bed, sofa, or chair, with his nates on the margin, and a pillow between his knees. The operator having cautiously introduced one limb of the quadruple-hooked forceps into the rectum, in order to obtain a firm hold, secures the tumours on the one side of it. He next grasps those on the other side, and, drawing the whole towards him, applies a straight bistoury at the exterior of the swelling, and by a circular incision insulates the extremity of the rectum from its cutaneous attachments; then, gently elongating the gut, he takes away the morbid structure.

In the female it is advantageous to begin the incision at the perineum, to avoid injuring the support of the vagina. The diseased mass being removed, a piece of sponge, of a conical shape, and about three inches long, covered with lint well larded, and having a piece of tape fixed to its base, is to be introduced into the rectum. A large compress of linen is to be applied, and supported with the T bandage.

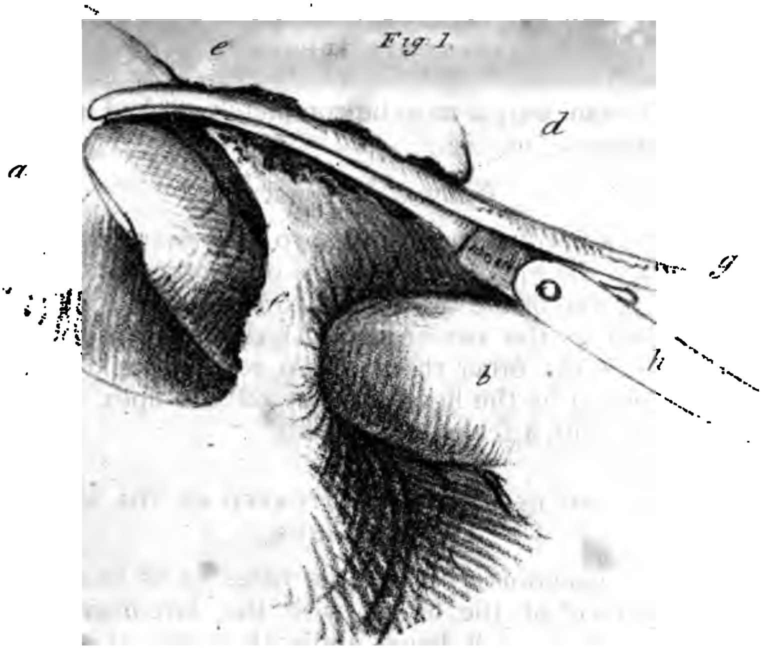
Excision with the Scissors.

The tumours having been made to protrude, an assistant passes a common hook or tenaculum through one or two of the largest, while the operator seizes another lengthwise with the polypus forceps; he then draws the tumour a little towards the axis of the gut, and, with a large pair of scissors passed behind the forceps, cuts off all that portion which is engaged between its blades.

He proceeds in the same manner to remove those tumours which the assistant holds transfixed by the hook.

By fastening and drawing out the tumour with the forceps, we much facilitate its removal by the scissors. When the operation is finished, the protruded parts generally retire within the sphincter. Should any

Plate 9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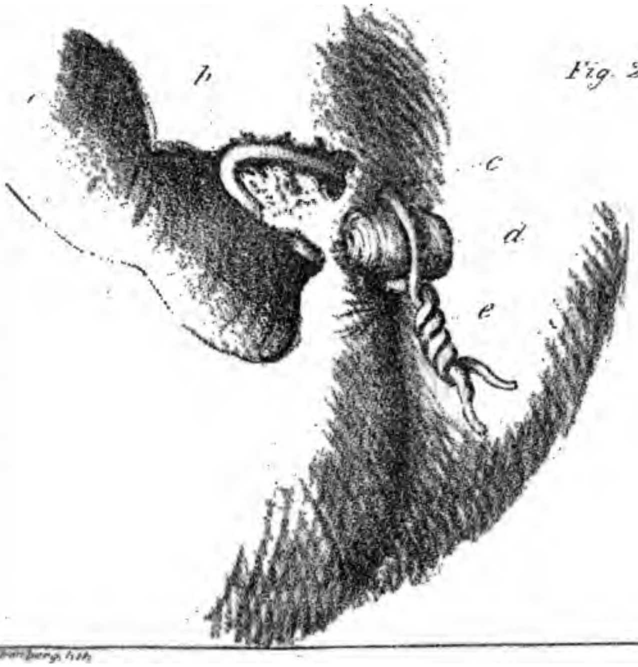
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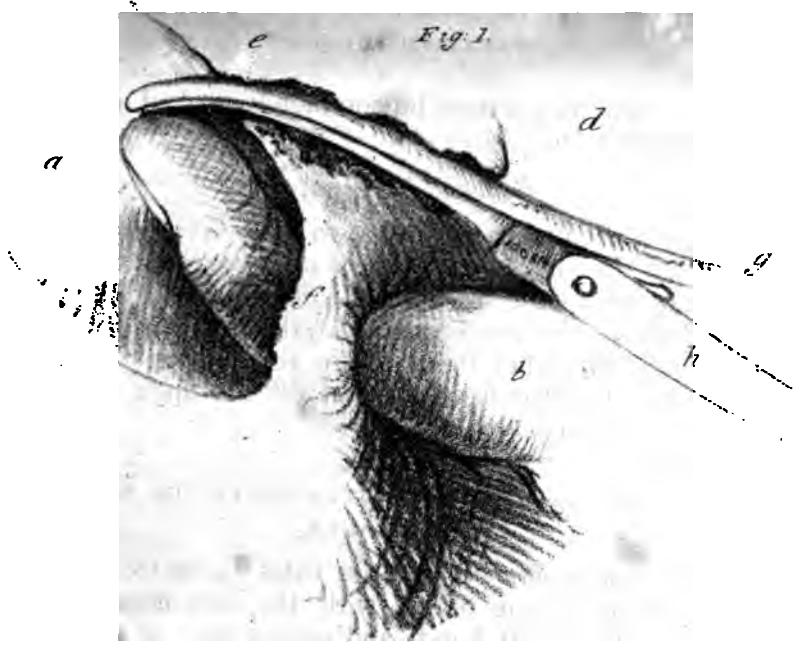

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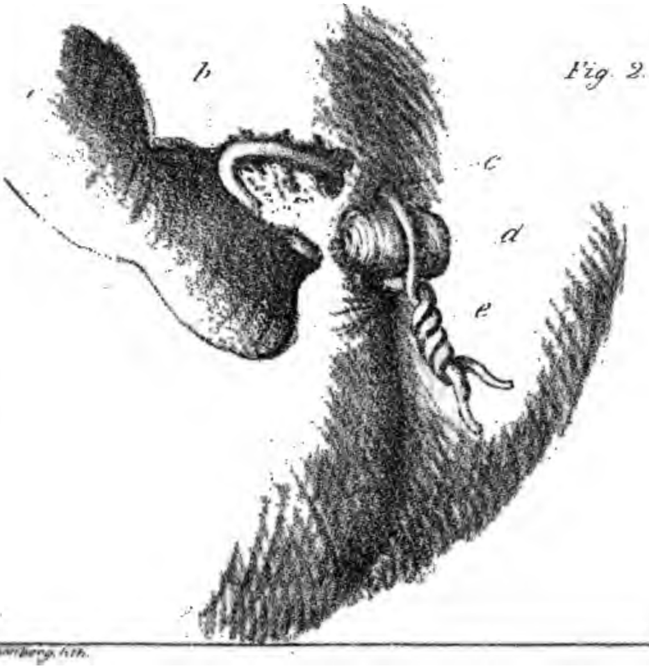

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part remain out, it must be completely pushed in with the finger.

Removal by Ligature.

Pass a needle, armed with two firm waxed threads, through the middle of the basis of the tumour. The ends of one of the threads are to be firmly tied round one half of the swelling, whilst the other half is secured by the other thread. To remove the tension occasioned by the ligatures, cut off the apex of the tumour with a scalpel.

WARTS AND EXCRESCENCES SITUATED AT THE MARGIN OF THE ANUS.

The operator separates the nates so as to expose the orifice of the bowel with the fore-finger and thumb of the left hand, and with a pair of curved scissors cuts off the tumour or tumours as near to the verge of the anus as possible.

Plate IX.

OPERATIONS FOR FISTULA IN ANO.

Fig. 1.—*a* Rectum.
- *b* Fore-finger in the gut.
- *c* Anus.
- *d* External opening of the sinus.
- *e* Internal ditto.
- *f* Intervening portion betwixt the gut and sinus.
- *g* The director passed from the external opening of the sinus into the gut.
- *h* Probe-pointed bistoury pressing on the finger.

Fig. 2.—*a* Rectum.
- *b* Internal opening of the sinus.
- *c* External opening of the sinus.
- *d* A portion of lint between the wire and skin.
- *e* The wire twisted on the outside of the sinus and anus.

FISTULA IN ANO.

The patient is made to rest his head on a low chair or bed, with his breech raised, and exposed to a strong light. The fore-finger of the left hand, oiled, is to be introduced into the rectum, while the right introduces a director from the external orifice, through the sinus, until it enters the gut. Along this the probe-pointed bistoury is passed until the point meets the finger. The finger being firmly pressed on the point of the knife, they are withdrawn together, and the skin and integuments between the gut and sinus are divided.

When no communication between the intestine and sinus can be discovered, a sharp-pointed bistoury must be introduced into the farthest extremity of the latter, and pushed through the coats of the intestine, upon the point of the fore-finger, and drawn along, as before directed, till it reaches the anus, so that a full division of the sinus may take place from one end to the other.

Ribes states, that the internal orifices of the fistula are generally situated about the distance of five or six lines above the lowest portion of the intestine, but more commonly less, and that they then march a greater or less distance between the external sphincter muscle and the skin; hence, if we direct the point of the probe too high when it is introduced into the fistula, we shall never arrive into the rectum. Hence it will be necessary, to the accomplishment of our purpose, to carry the probe horizontally, and almost parallel with the perineum, particularly in the female, though it must be recollected that in the male it must be directed a little more upward.

When we have arrived into the fistula, the button of the probe must be slid along the internal face of the skin, without ever leaving it; afterwards it must be directed along its lower side, towards the lower portion of the rectum, and by this procedure the internal orifice of the fistula and the finger introduced into the rectum to meet it will readily be found.

Operation with the Wire.

Posture of the patient as before.

Introduce a probe (similar in size and shape to the one used for gunshot wounds, but made of lead) oiled, from the external orifice until it enters the gut. The fore-finger of the left hand, oiled, is to be introduced into the rectum; hook the end of the wire with it, and bring it towards the anus. This being accomplished, a portion of the long stem of the probe is to be cut off with the scissors, and the free ends projecting from the anus and sinus, one inch in length, are to be twisted. The wire must be twisted a little every day until the parts are divided.

A small roll of lint must be placed between the lead and skin externally.

To produce a radical and perfect cure where the skin is undermined, and the surrounding cellular tissue has been destroyed by suppuration, the cavity must be laid open its whole extent, and a free removal of the skin which has been excavated.

Martin Van Butchell's Plan.

He introduced a hard twisted silken cord, of no great thickness, through the fistula, into the intestine, and tied the two ends together on the verge of the anus as tight as the patient could conveniently bear, and with a slip knot. In four or five days, when the ulcerative inflammation had removed a sufficient portion of the upper edge of the interior opening of the fistula to slacken the silk, he tightened it again, and so on every four or five days, until the silken cord finally dropped away of itself.

POLYPI OF THE RECTUM.

When the polypus is situated near the margin of the anus it remains constantly exposed; take a thread of hemp or silk, strong and waxed, and form a noose, into which the thread is to be passed twice to make a double knot of it. Cause the polypus to pass into this noose, which is to be conducted even to its base, so as to comprehend a little of the skin from which it originates, in order to be more secure from its reproduction. Tighten the knot strongly, without being afraid of causing pain; a great constriction, which suddenly annihilates the nervous influence, lessens the amount of pain. Make also one turn round the base of the tumour with the ends of the ligature, which must be secured by a new knot upon the opposite side; then amputate the tumour one line below the ligature. Being free from all dread of hæmorrhage and pain, cut the thread, and apply upon the amputated spot a little lint, supported by a compress, which is itself to be sustained by a T bandage.

When included in the rectum, they come out occasionally in the efforts that are made to relieve the bowels.

If this protrusion be only partial, or if it should be too slow, draw the tumour downwards, either with the finger or with any suitable instrument; place a ligature upon its base, as in the preceding case, with the precaution of compressing in it a portion of the internal membrane of the rectum, and then perform the section. A simple bistoury is sufficient if the base of the tumour be naked; but if by drawing it down you cannot bring it outwards, make use of the kiotome; slip the sheath of this to the base, which must be engaged in the slope below the spot where it is tied; push the blade and make the section.

The kiotome consists of a cutting blade concealed in a silver sheath, which being hollowed at its extremity receives there, and fixes, the part to be extirpated.

Method of using the Bougie in Stricture of the Rectum.

The patient, if a male, leaning over the back of a chair, or the side of a bed, should draw aside the nates fairly to expose the orifice of the bowel.

In females the examination, being made under the bed clothes, is conducted without the slightest exposure.

A full-sized bougie, not less than eleven inches in length, thoroughly softened and well oiled, adapted to the shape of the passage through which it is to be passed, is to be introduced with the convexity of the first curve towards the sacrum, in which way it is to be passed upwards and backwards, about two inches through the third portion of the bowel, provided it gives no pain, for the introduction will commonly produce an uneasy sensation.

The bougie should at first be of such a size, as to pass the stricture without considerable resistance; for if much force be applied it cannot fail of exciting too great an irritation, and of proving injurious by inducing inflammation.

We continue to propel the bougie in the same direction about three or three and a half inches higher, or through the second portion of the rectum; the point of the instrument will now bear directly upon the hollow of the sacrum, and the butt end towards the left side of the body. With a view, therefore, of avoiding the sacrum, and of accommodating the instrument to the great curve of the rectum, we change its position by describing the segment of a circle from left to right, with the butt end, turning it upwards at the same time, continuing to propel the instrument. Having described this segment, we shall have carried the bougie full four inches further, or to what may be considered the extent of the rectum. But it is yet to be introduced into the sigmoid flexure; we therefore triflingly depress the butt of the instrument, at the same time propelling it upwards till the whole is fairly within the sphincter.

As there is always more or less of spasmodic action excited on passing the bougie, it should be introduced in as slow and gentle a manner as possible; and it is generally necessary to desist a short time from pushing it forward when it arrives at the stricture, until the spasmodic action ceases.

Plugging of the Rectum.

Pass into the rectum a silver canula which has a circular rim or collar; around this collar is fastened the circumference of a sort of linen shirt, which forms a cul de sac, into which with dressing forceps lint is crowded, either by itself or impregnated with absorbent powders. When lint enough has been passed in, it is easy to conceive that by pulling on the ends of the canula, and of the bag of linen which projects outwardly, whilst with the fingers we make pressure on the lint, the mass is obliged to spread itself transversely, and to assume the shape of a mushroom. The direct compression by which this is followed arrests the hæmorrhage.

Hæmorrhage from a small fungous Tumour within the Rectum. — The fungus having been made to protrude by means of a purgative injection, the bleeding vessel was taken up with a tenaculum and tied, including at the same time a small portion of the tumour.

When the ligature does not entirely command the hæmorrhage, the free application of the nitrate of silver is often very beneficial.

IMPERFORATE VAGINA.

A straight incision, or if the membrane be very dense a crucial incision, should be made through it, and the wound kept from uniting by the introduction of a sponge tent or roll of linen. In obliteration of the vagina, or a concretion of its sides, the operator must proceed by slow and cautious dissection, guarding with extreme care the bladder on the one side and the rectum on the other.

Adhesion of the Labia Pudendi.

Pass a probe-pointed bistoury into the orifice immediately before the meatus urinarius, and cut downwards to the inferior junction of the labia. Separation of the parts in an infant may be accomplished by a firm and somewhat distracting pressure upon each labium at the same time, which scarcely makes the child complain, though the small vessels which had inosculated from one labium to the other may be perceived to be dragged out during the continuance of the pressure.

Removal of Excrescences from the Labia of Women.

The patient being placed in the same manner as in the lateral operation, commence by separating the labia with the fore-finger and thumb of the left hand, and with a pair of curved scissors cut off the tumours as near to their base as possible.

Removal of the Clitoris.

The patient must be laid on her back, with the hips slightly elevated. The clitoris being exposed, the operator takes hold of it with a pair of forceps or a tenaculum, raises it and pulls it forwards, and with one or two strokes of a scalpel separates it from its connections.

Amputation of the Nympha.

The patient being placed in a proper position, and the labia majora separated by the fingers of an assistant, the diseased part is drawn forward by means of the fore-finger and thumb of the operator, and with a scalpel or a strong pair of blunt-pointed scissors he cuts it off.

The incision is carried from below upwards. The hæmorrhage may be stopped by the application of spirit of turpentine.

Polypi of the Vagina.

We must insert into the ring of the serre-nœud the two ends of the waxed ligature, with which we form a noose, and attempt to engage in it the base of the tumour by conducting it to that, through the assistance of the index and middle fingers.

When it has reached there, the serre-nœud is pushed upward and the thread drawn downward; the constriction takes place, and the thread is secured to the cleft of the serre-nœud. If the polypus be inserted too high, its inferior extremity must be seized with a small double hook, and drawn downwards;

then the noose is slipped along the instrument, into the pedicle of the tumour, which it embraces.

The porte-nœud is a simple canula of silver, about seven inches long, slightly curved backwards to adapt itself to the convex form of the polypus.

Two rings are placed at its lower extremity, either for the ease of the operator, or to secure the thread at the moment when the instrument is pushed into the vagina. The other extremity is terminated by an oval button, hollowed like a funnel, and whose sides are polished and rounded.

The serre-nœud is a silver stalk, terminated superiorly by a ring, through which are passed the two strings of the ligature, which are then to be attached to a cleft that is found in the inferior extremity of the instrument.

Method of using the Speculum Uteri.

The patient is laid in the position for lithotomy. The surgeon places himself in front of the os externum, warms and greases the instrument, and passes it, closed, with gentleness into the vagina, making pressure principally upon the posterior commissure of the pudendum. Having done this, he opens the handles, and dilates the vagina. By these means the os internum and vagina, with their diseases, are exposed.

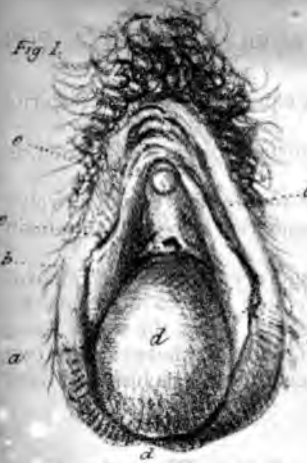
Plugging the Vagina in case of Uterine Hæmorrhage in the early Months of Pregnancy.

Soft rags, or lint soaked in oil, are to be cautiously introduced into the vagina until its cavity is completely filled. A firm compress, wet with cold water and vinegar, is to be fixed by a T bandage over the external orifice, so as to prevent the plug from being displaced.

Mr. Ingleby says, for the purpose of plugging the vagina a soft sponge soaked in vinegar, solution of alum, or other styptics, is usually selected; but sponge, unless smeared with ointment or steeped in oil, is not well adapted for the purpose, since from its porosity the blood is not completely coagulated, the liquid parts passing through its substance. I give preference to lint, cotton, wool, or a soft handkerchief.

I have found great and speedy benefit from plugging the

Plate 10.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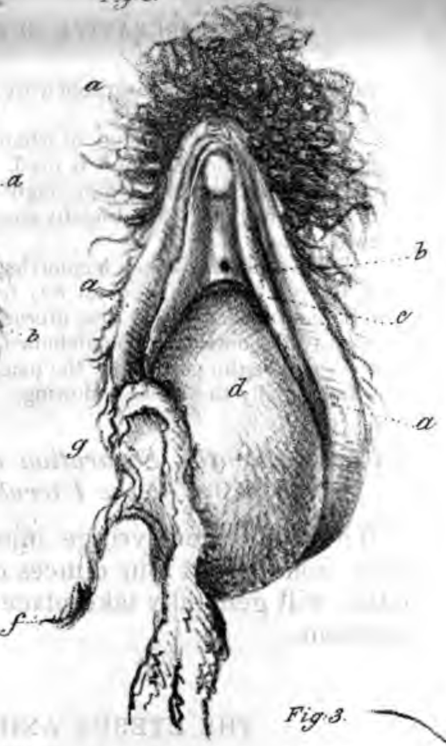
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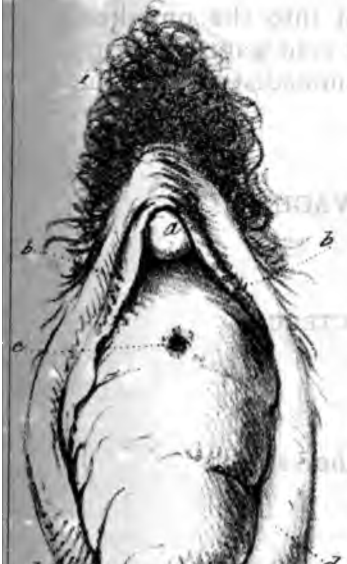
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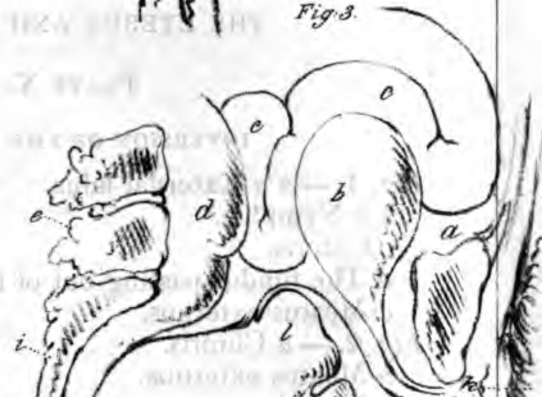
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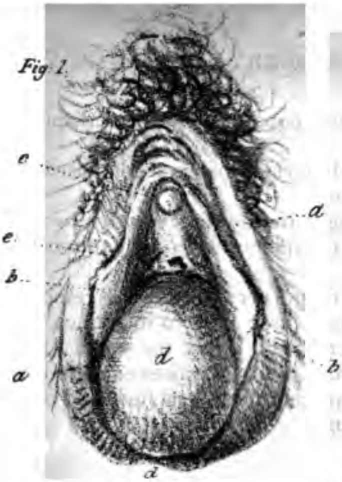

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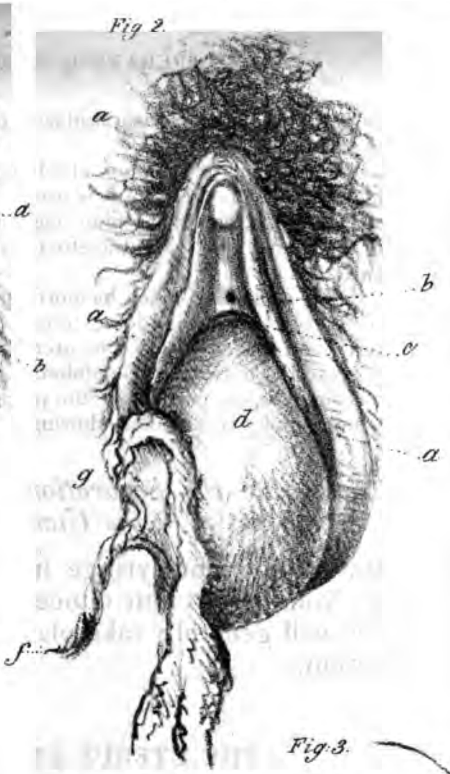

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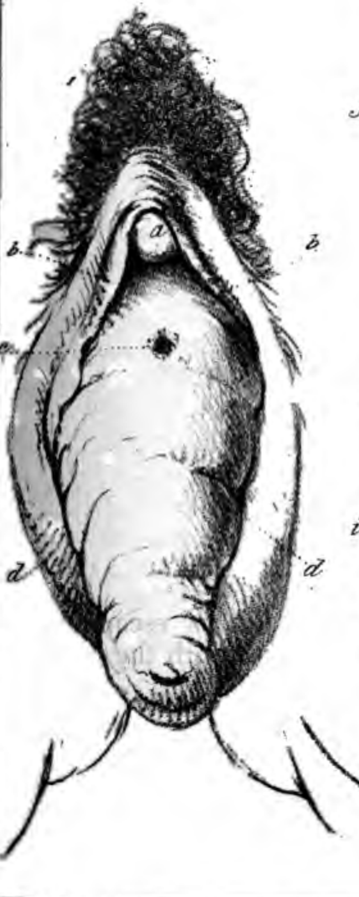

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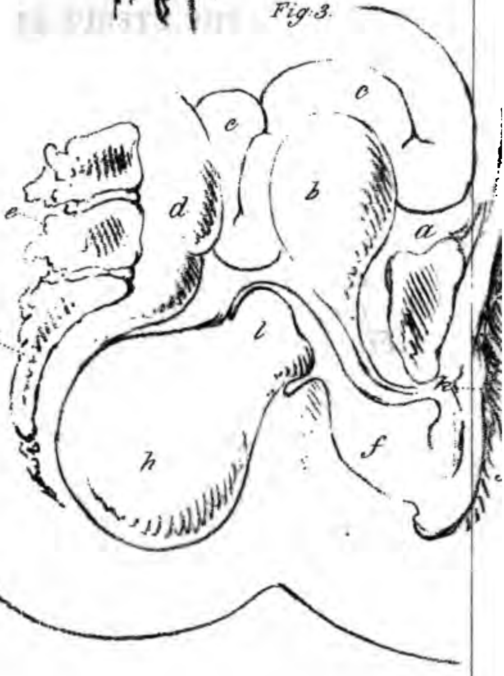

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W.P. Cocks del^t

vagina with a sponge saturated with equal parts of oil and spirits of turpentine.

The removal of the plug, of whatever substance composed, is facilitated if oiled before it is used.

Dr. Dewees says, the plug ought to be removed after twelve or fourteen hours. Mr. Ingleby considers it necessary to remain twenty-four.

Dr. Gooch says, when hæmorrhage occurs after the removal of the placenta, the quickest way to stop it is to introduce the left hand closed within the uterus, and apply the right hand open to the outside of the abdomen, and then between the two to compress the part where the placenta was attached, and from which chiefly the blood is flowing.

To accelerate the Separation of the Placenta from the Uterus.

With a common syringe inject into the umbilical veins from one to four ounces of cold water. Uterine action will generally take place immediately after the injection.

THE UTERUS AND VAGINA.

Plate X.

INVERSION OF THE UTERUS.

Fig. 1.—*a a* External labia.
  b b Nymphæ.
  c Clitoris.
  d The fundus passing out of the vagina.
  e Meatus externus.
Fig. 2.—*a* Clitoris.
  b Meatus externus.
  c Nymphæ.
  d The fundus and body of the uterus escaping through the mouth of the uterus, with the placenta (G) and membranes adhering to it.
  f Umbilical cord.
Fig. 3.—Complete inversion of the vagina.
  a The clitoris,
  b b The nymphæ.

c The meatus urinarius.
d d External labia.

Fig. 4. — Retroversion of the womb.
a Os pubis.
b Bladder.
c Small intestines.
d Rectum.
e Last lumbar vertebra.
f Vagina.
g Labium externum.
h Fundus of the uterus fallen back on the os coccygus.
i Sacrum.
k Meatus urinarius.
l Os internum turned up.

PROLAPSUS OF THE UTERUS.

The patient must be laid on her back, with her hips slightly elevated. The surgeon makes gentle pressure on the tumour, in the line of the axis of the pelvis, until it returns into its natural situation.

RETROVERSION OF THE UTERUS DURING GESTATION.

The patient being placed upon her back, with the perinæum free over the edge of the bedstead, and her shoulders a little depressed, the parts should be well lubricated with hog's lard or oil; a chair should be placed for each foot to rest upon, and these supported by two assistants. The bladder and rectum being emptied, the hand lubricated should be passed into the vagina in a state of supination, the fingers retracted in such a manner as to form a straight line at their extremities. They must then be gently pressed against the base, as it were, of the tumour found within the vagina, so as to move it backwards and upwards, along the hollow of the sacrum, until the mass shall reach above the projection of this bone. When thus far the hand may be withdrawn, and a pessary be introduced of the proper size. The woman must remain quiet in bed for three or four days. The urine for this period should be drawn off as often as may be required, and the fæces evacuated by injections.

The attempt may be made at any period of gestation, whenever symptoms become urgent.

Directions for placing the Pessary.

The bowels of the patient having been freely opened, and the urine passed, it is desirable that she be put to bed an hour or two previously to the operation; then being placed perfectly horizontally on the bed, and near its edge; the parts lubricated, as well as the instrument, with hog's lard. The labia must be separated by a couple of fingers, one placed on each labium, and the pessary then pressed gently, but firmly, against the os externum, directing the force downwards towards the internal surface of the perineum, and backwards in the direction of the vagina, but in such a manner as shall make the introduced edge look towards one of the sacro-iliac junctions. We continue to press the instrument forwards, in the course just pointed out, until the whole of it is received into the vagina. Then the finger must give it a transverse direction, or, in other words, the breadth of the pessary must correspond with the small diameter of the inferior strait. This is easily effected, and we can judge whether it be well placed by feeling for the hole in its centre, which must always correspond with the axis of the os externum or vagina.

It will generally be found most convenient for the operator to have the right side of his patient next him, as in this position he will command the introduction of the pessary with his right hand.

INVERSION OF THE UTERUS.

Place the woman on her back near the edge of the bed; and have the legs supported by proper assistants.

If the placenta adhere to the uterus, it must be removed prior to any attempts at reduction. This being accomplished, the operator grasps the bulk of the protruded part firmly, but gently, so as to reduce its size, and with gentle and steady pressure urges the prolapsed part upwards into the axis of the os uteri.

It is not prudent to make any violent efforts to reduce the uterus, as these may excite convulsions. Soon after becoming inverted, the uterus is apt to swell and inflame; if this have happened, no attempt should be made to reduce, till by bleeding and rest and mild fomentation, that state has been allayed.

We must in every instance alleviate urgent symptoms, such as syncope, retention of urine, or inflammation, by suitable means.

LIGATURE OF POLYPUS OF THE UTERUS.

The patient should be placed upon a bed, lying upon her left side, with her knees drawn up towards the abdomen. The external parts should be dilated if necessary. The fore-finger of the practitioner's left hand, previously oiled, is now to be carried through the vagina to the neck of the tumour. The brass rod (previously prepared, with the ligature and its curvature adapted to the shape of the tumour) is to be passed up by the right hand to that part of the neck of the tumour where the fore-finger of the other hand is placed.

One extremity of the ligature (waxed silk) is twisted round the rod, whilst the other is passed through the ring at its upper extremity, and allowed to remain free. As tumours are of different degrees of convexity in different cases, and as the distance of their necks from the os externum is very various, the practitioner must be provided with two or three rods of different lengths, made of flexible metal, so as to be adapted to the shape of the tumour.

The ligature is then to be secured by the finger, and the brass rod is to be carefully carried round the neck of the tumour till it comes to that part where the ligature was secured. The practitioner is now to secure also under his finger that part of the ligature which has been carried round the neck of the tumour, and the rod is to be carefully withdrawn. In some cases it will be found more convenient to steady a part of the ligature with the rod, and to carry the other part of it round the neck of the tumour with the finger. In performing this part of the operation, great care is to be taken not to include any part of the os uteri. Before the ligature is tightened, the patient is desired to inform the operator if she feels pain, because if the tumour only is included in the ligature no pain will be felt.

The extremities of the ligatures, which hang out of the os externum, are now to be drawn through the canula by the piece of wire (which had been previously doubled and carried through the canula, so as to form a noose projecting from it), and after the canula has been gently passed up to the neck of the tumour, they are to be drawn tight, and are then to be twisted round the shoulders of the canula, where they are to be secured.

> A silver canula, of a length sufficient to reach from the neck of the tumour to the distance of an inch or an inch and a half from the os externum, should be prepared, and near the extremity which is to hang out of the external parts, there should be placed two small shoulders, round which the ends of the ligature may be twisted.

The patient is now left, and great care is to be taken by the nurse that the canula is not moved when the contents of the bladder are expelled. The practitioner is to examine the state of the ligature every day, and to tighten it as often as it is found at all slackened.

LACERATION OF THE PERINÆUM OF LONG STANDING.

After very carefully paring the edges of the cicatrised lips of the fissure, pass two, three, or four strong double ligatures through the lips of the wound by means of curved needles introduced on the one side from without inwards, and on the other from within outwards; two pieces of bougie are then laid along the two edges, and accurately retained in their position, one being received into the loops of the ligature while their loose ends are tied firmly over the other.

In recent cases of laceration of the perinæum, little else will be necessary than rest and retaining the thighs as much together as possible, with frequent ablution in order to remove the urine, which sometimes for a few days flows involuntarily, or the lochia and stools.

The actual Cautery in Vesico-Vaginal Fistula.

The patient lying forwards upon a table, with her limbs hanging over the ends, which should be near a window, elevating the pelvis upon bolsters or blankets placed under it. The legs should be separated, and the light thrown as much as possible into the vagina. Where sufficient light cannot in this way be procured a candle must be used. The speculum is to be introduced, and the lesion brought into view. A flat female catheter must now be passed through the urethra, and placed across the opening within the bladder, taking care at the same time to reduce any protrusion of the vesical mucous membrane, and retain it out of the reach of the cautery. When the opening into the bladder is very considerable, or the catheter is insufficient, it may be necessary to pass a second instrument through the urethra to effect this object. As folds of the vaginal mucous membrane sometimes protrude between the blades of the speculum, the operator must guard against this, and examine whether the instrument be so adjusted as to prevent the vaginal passage being injured by the iron, taking care that the interior of the bladder is well protected, and the edges of the aperture completely within his reach.

Having satisfied himself in these respects, he is carefully to introduce the cautery, heated to a white heat; and having steadily touched the edges of the fistula, to withdraw it, and introduce a pledget of lint, dipped in cold water, after which he may gradually remove the speculum.

The vagina is protected by three broad spatulæ; one is introduced towards the perinæum, and one on each side of the vagina.

Employment of the Suture for Vesico-Vaginal Fistula.— Case. —The patient was placed in the position adopted for the operation of lithotomy, and the operator introduced the fore-finger of the right hand, covered with the finger-piece of a glove, into the fistulous opening; the two last phalanges of the fore-finger were then bent like a hook, and the callous edges of the ulceration on the left side dragged down to the orifice of the vagina; this edge was then sliced off by a semi-lunar incision, with a straight bistoury, held in the left hand; the left fore-finger was then introduced into the fistula, its callous border on the right side made to present externally, and then sliced off, like the former, by the bistoury, held in the right hand. In order to retain the pared edges in contact, the operator provided himself with three much-curved and very small needles, each armed with a thread, and mounted on a handle, which might be fixed or removed at pleasure. The index finger of the right hand was then re-introduced into the opening, and its left lip again brought into view. Taking a needle, mounted on its handle, in the left hand, it was carried from behind forwards, through the vesico-vaginal wall, near the posterior angle of the wound. The second and third needles were then passed in the same manner, and at equal distances from each other, and the same steps pursued on the opposite side. The ligatures were tied two and two, the lips of the wound brought in accurate contact, the patient conveyed to bed with injunctions to lie upon her back, and a catheter introduced into the bladder to prevent the urine accumulating in it.

RECTO-VAGINAL FISTULA.

The patient is laid supine at the edge of her bed, the thighs being separated, and bent upon the pelvis. A speculum ani or uteri is introduced into the vagina, and the fistula exposed to view. With argenti nitras in a port-crayon the operator lightly touches the edges of the wound. An eschar forms and separates.

The caustic must be frequently applied.

CÆSARIAN OPERATION.

An incision should be made just below the umbilicus, and carried five or six inches downwards towards the symphysis pubis, through the skin and cellular tissue. The linea alba must now be cautiously divided, to discover the peritoneum, in which a small opening must be made.

A finger of the left hand must be introduced into this hole, and the abdominal teguments a little raised by it, to prevent any of the parts within being injured by the instrument, for which the finger serves as a director. The uterus being exposed, a slight degree of pressure is to be made above the umbilicus, to bring the fundus nearer to the superior angle of the wound. It is then to be opened in the middle of its anterior part with the scalpel until the membranes are discovered. An opening only large enough to admit the finger should be made into them, taking care not to wound the child. The fore-finger is then to be passed into their cavity, as a conductor for the bistoury, with which the uterus must be opened, cutting from within outwards. The incision of the uterus must extend as high as the superior angle of the external wound, and terminating below an inch and a half above the inferior angle of it. When the uterus is properly opened the hand must be passed into it, and the feet searched for and brought out, except where the head presents naturally to the wound. Sometimes it is found necessary to separate the placenta with the fingers.

To prevent the escape of the intestines through the external incision Professor Graafe advises the employment of large pieces of sponge prepared with wax, each one foot long, six inches broad, and nearly three inches thick. Three such pieces are necessary for one operation. They should be applied to the abdomen, so as to leave for the incision a space eight inches long by three or four wide, and are to be retained by two or three assistants, who should make moderate pressure with the hand, care being taken that every portion of intestine has been removed from the place reserved for the incisions.

Pressure on the sponges will then keep the bowels at a distance, and prevent their escape.

DIVISION OF THE SYMPHYSIS PUBIS.

Make an incision two or three inches long through the integuments, covering the pubis at the upper and central part of the symphysis quite down to the bone; then introduce the fore-finger of the left hand as a director, and cautiously divide the anterior ligament and cartilage, then the posterior ligament. The pains occurring generally produce a sufficient separation of the bones; but if this be not the case they are to be separated with the greatest caution to the extent of an inch, or an inch and a half.

EMBRYULCIA.

The head, if moveable at the superior strait, should be fixed. If the uterus, after the evacuation of the waters, does not contract with sufficient force to do this, the point of the scissors must be made to penetrate the cranium; and if a suture can be found, it should always be preferred. When they are introduced as far as their shoulders will permit, the handles are to be separated to some distance, and rotated in that situation, until an opening of sufficient size to admit the crotchet be made. When this is done, the crotchet must be passed into it, and the brain broken down with it; which accomplished, the point of the crotchet is to be fastened in the nearest portions of bone; and it must, if practicable, be guarded by the fingers of the other hand against slipping. If the bones collapse readily, and the pelvis be much contracted, the head may pass nearly entire; but if it be necessary to employ much force, the portions of bone on which the crotchet is fixed will successively give way. The detached portions must be carefully removed from time to time, taking care not to wound the vagina in extracting them.

ANEURISM.

The disease of aneurism, which consists in a permanent dilatation or breach of the coats of an artery, may be produced by external violence, as a strain or puncture, or by arterial debility.

According to some surgical writers, the causes of aneurisms operate either by weakening the arterial parietes or by increasing the lateral impulse of blood against the sides of these vessels. Thus they are said to be occasioned by violent concussions, the abuse of spirituous drinks, frequent mercurial courses, fits of anger, rough exercise, &c. &c. &c.

The last is the more common cause; and it may be local or general: it may be limited to the part in which the aneurismal swelling occurs, or it may extend through the whole range of the arterial system, which is sometimes found to be universally, though irregularly feeble, and consequently feebler in some parts than in others.

Aneurism is a pulsating tumour containing blood, and communicating with the interior of an artery; when seated in one of the extremities or upon any superficial branch, it is generally called external; when situated upon any of the arteries of the cavities, as the abdomen or thorax, it is termed internal.

TRUE ANEURISM.

In consequence of the local dilatation of a part of an artery, but more frequently without any previous dilatation, the internal coat being ulcerated or lacerated from a slow internal cause in some point of its circumference, the blood impelled by the heart begins immediately to ooze through the connections of the fibres of the muscular coat, and gradually to be effused into the interstices of the cellular covering, which supplies the place of a sheath to the injured artery, and forms for a certain space a kind of ecchymosis, or extravasation of blood, slightly elevated upon the artery. Afterwards, the point of contact between them fills and elevates in a remarkable manner the cellular covering of the artery, and raises it after the manner of an incipient tumour. Thus the fibres and layers of the muscular coat being wasted or lacerated, or simply separated from each other, the arterial blood is carried with greater force and in greater quantity than before into the cellular sheath of the artery, which it forces more outwards.

Finally, the divisions between the interstices of the cellular coat being ruptured, it is converted into a sac, which is filled with polypous concretions, and with fluid blood; and at last forms, properly speaking, the aneurismal sac, — the internal texture of which, although apparently composed of membranes placed one over the other, is, in fact, very different from that of the proper coat of the artery; notwithstanding the injured artery, both in the thorax and in the abdomen, as well as the aneurismal sac, is covered externally, and inclosed within a common smooth membrane.

In the true aneurism the artery is either enlarged at only a small part of its track, and the tumour has a determinate border, or the vessel is dilated for a considerable length, in which latter circumstance the swelling is oblong, and loses itself so gradually in the surrounding parts, that its margin cannot be exactly ascertained. The first case, which is the most common, is termed the circumscribed true aneurism; the last, the diffused true aneurism.

Symptoms. — In true aneurism, the first thing the patient perceives is an extraordinary throbbing in some particular situation; and on paying a little more attention, he discovers there a small pulsating tumour, which entirely disappears when compressed, but returns again as soon as the pressure is removed. It is commonly unattended with pain or change in the colour of the skin. When once the tumour has originated, it continually grows larger, and at length attains a very considerable size. In proportion as it becomes larger, its pulsation becomes weaker; and, indeed, it is almost quite lost when the disease has acquired much magnitude. In proportion as the aneurismal sac grows larger, the communication into the artery beyond the tumour is lessened. Hence in this state the pulse below the swelling becomes weak and small, and the limb frequently cold and œdematous.

FALSE ANEURISM

Is a tumour formed by the effusion of blood into the adjoining cellular tissue, either immediately after a wound, or in consequence of the rupture of a cicatrix.

Symptoms. — The swelling produced by the infiltration of blood into the cellular tissue of the part is uneven, often knotty, and extends upwards and downwards along the track of the vessel. The skin is also usually of a dark purple colour. Its size increases as long as the internal hæmorrhage continues; and if this should proceed beyond a certain pitch, mortification of the limb ensues.

INTERNAL MIXED ANEURISM

Is said to take place, when the external cellular, muscular, and internal cellular tunic are destroyed, and allow the internal or serous membrane to protrude through the opening, so as to form a tumour, of a globular shape, filled with blood.

The external cellular tunic of an artery may be easily separated into three layers. These layers are gradually, as they proceed inwards, changed in their nature from that of the general investing cellular membrane; and are at last incorporated into a more regular coat, which has been termed the tendinous coat; it is dense, white, and elastic, and has much more toughness than the inner coats.

Having removed the outer layers, the muscular coat appears. It consists of pale fibres, coiled obliquely round the circumference of the vessels, but none of them forming a complete circle. If an artery be stretched transversely, it will retract.

The internal cellular is the connecting medium betwixt the muscular and serous tunics. This coat is difficult to be demonstrated; but by slitting up the artery, and separating the serous coat, its existence may be shown.

The serous or innermost membrane is a continuation of that which lines the left cavities of the heart. It is very thin, fine, transparent, absolutely destitute of fibres, smooth, and as if serous; it breaks and tears with the greatest facility.

The coats of the arteries are supplied with a very complicated net-work of minute arteries, called vasa vasorum. They may be distinctly seen in all vessels that are not less than half a line in diameter; but they cannot be traced into the substance of the serous coat.

The nerves of the arteries are so very small, that they are traced with difficulty: they are supplied by the spinal marrow, and great sympathetic nerve, and are principally distributed to the fibrous coat.

VENOUS ANEURISM.

A tumour arising from a preternatural and direct communication formed between a large vein and a subjacent artery.

Symptoms. — There arises over the artery, a few weeks after the accident, a flat swelling of the vein, with the mark of the lancet in the middle of it. On placing the finger upon this tumour a faint pulsation or vibratory motion is felt. There is a noise, or at least a peculiar feeling which conveys that idea, "between thrilling and whizzing." The tumour gradually extends from the median-basilic to the other veins; but the varicose enlargement is chiefly of the median-basilic, median-cephalic, basilic, and cephalic veins.

This disease generally arises from pricking the artery while bleeding in the arm.

ARTERIAL ANASTOMOSING ANEURISM

Begins from a mark which had existed as a discoloured spot from birth; or it appears, at first, like a small fiery pimple; or it succeeds a blow, or some other injury; or it begins without any obvious exciting cause. In whatever way it begins, it is at first small, but gradually increases in size; the pulsation, which originally was obscure, becomes a prominent feature in the complaint; the swelling still enlarges; the pain, and feeling of distention augments; and when the cells are enlarged into sacs, and the mutual communications consequently free betwixt the extreme arteries and veins, the whole tumour pulsates distinctly: and when excited by exertion or muscular struggles, throbs furiously, and assumes then a purple hue; the apices of the sac become sensibly thin; the patient is alarmed, from time to time, with slight hæmorrhages, which becoming more frequent from various points, and very profuse, he is at last debilitated, changes his complexion and colour, loses his health, and gradually sinks.

DIAGNOSIS OF ANEURISM.

Aneurism may be distinguished from other diseases by the following marks: — If the aneurism be small, press the artery which leads to it, and you will empty the aneurismal bag; but if the aneurism have existed long, is very solid, and its pulsation not very strong, — sit by the patient's side, observe carefully the size of the swelling, press your finger on the artery above, and the aneurism will sink under the pressure on the artery; upon giving up that pressure, suddenly a jet of blood rushes into the aneurismal bag, and raises it to its former height.

Pulsation in a tumour is generally supposed to be the most distinguishing symptom of aneurism. It does not, however, follow that all tumours which pulsate are aneurisms. Pulsation of a tumour will often take place without being connected with this disease. Thus, any encysted or even solid tumour, situated in the neighbourhood of or upon a large artery, may have a considerable degree of motion communicated to it from the pulsation of the artery. If on placing our fingers behind the tumour and drawing it forwards, the pulsation then ceases, it cannot be an aneurism. It is not in every case of this kind, however, that we can place our fingers behind the tumour; still we may distinguish between the diseases by attention to the nature of the pulsation. If it is a tumour placed on or near an artery, and deriving its motion from its situation, the whole of it will move at once, as one body, and without any alteration of size. If it is an aneurism there will be, in every part of the tumour, a sensation of dilatation superadded; it will not only move, but it will expand,

LIGATURE OF ARTERIES IN GENERAL.

In operating for aneurism due regard must be had to the direction of the incision and the application of the ligature; the first will of course depend upon the situation of the artery affected.

The present method of applying ligatures, which is as good as can be, is as follows: — Tie a tight knot with a fine ligature, and then cut one end close to the vessel, letting the other hang out of the wound.

Care should be taken that the ligature be applied so as not to form an oval by one part being higher than another; it should be applied as circularly as possible round the artery, the parts which are to unite will then be in the most perfect apposition.

Dr. Hunter has found by experiment, that when an artery is tied very tight, it is apt to burst in throwing in an injection, whereas, when the ligature is of moderate tightness, it will resist almost any force.

It will be necessary to apply two ligatures when the operation has disturbed the artery from the cellular membrane to any extent; in which case, divide the artery in the middle, which will leave room for retraction; but when the artery has not been disturbed, apply the single ligature only.

Mr. J. Bell observes, in great aneurisms of the arm or thigh, when the tourniquet can be applied, do your operation deliberately, steadily, slowly, but do not needlessly prolong your patient's suffering. Cut the skin nicely, open the sac freely, (*there is no necessity for opening the sac in those cases in which you can tie the vessel above where it has been wounded, unless the sac is very large*), dissect your artery very clean, and tie it clear of the nerve, and pass your ligature with a blunt needle or crooked probe; for whenever you are reduced to the necessity of using the sharp needles, your patient is in danger. Tie your artery with moderate firmness,— tie in two places, (for on several occasions the retrograde blood has flowed out even in the time of the operation,) — clean the sac, look now attentively to your two ligatures, and if you see the upper one moving according to the pulsation of the artery, all is right. Finally cut the artery across in the middle, betwixt the ligatures.

REMOVAL OF LIGATURES.

Dr. Jones observes, it is certainly desirable, that the ligature should come away as soon as possible; yet I am convinced that great care is necessary in endeavouring to expedite this event. We should always remember that so long as the attachment of the ligature appears to have any degree of firmness, any force exerted on it (as, for instance, by pulling strongly), must act more or less on the recently cicatrized extremity of the artery, which is not only contiguous to it, but is still in union with that portion of the artery which detains the ligature; for it is the external coat of the artery, which hinders the separation of the ligature, partly in consequence of its undergoing ulceration slowly, and partly because the ulceration, which takes place in the first portion of the artery, by rendering the ligature loose, diminishes very much its power of promoting ulceration through the rest of the artery. But so long as any portion of this external coat remains entire, it is continuous with the external coat of the newly cicatrized portion of the artery, and therefore any force exerted on the former may be extended to the latter: hence it appears most prudent, that so long as our attempts to draw away the ligature meet with much resistance, they should only be exerted in such a gentle and gradual manner, as may promote ulceration of the part by which the ligature is confined, without endangering laceration of the recently united parts.

Wounds of the Palmar Arches.

If any of the vessels of the arches be wounded, it will be found difficult to secure them in the situation of the wound, in consequence of the condensed texture of the tissue. If found impossible to stop the hemorrhage by compress and bandage, it will be necessary to put a ligature round the radial and ulnar arteries as soon as possible.

LIGATURE OF THE RADIAL ARTERY AT ITS INFERIOR PART.

An incision corresponding with the middle of the space which separates the tendons of the supinator radii longus and the palmaris longus muscles, must be made, to divide the skin, and a grooved director inserted under the aponeurosis, in order to divide it to the same extent as the skin. This done, the artery with its accompanying veins is seen; the insulation must be carefully done, so as not to wound the veins; raise it with a grooved director, and tie it.

LIGATURE OF THE RADIAL ARTERY NEAR THE BEND OF THE ARM.

Having supinated the fore-arm, and made the ulnar edge of the supinator carpi radialis longior evident, an incision should be carried along it for two inches, and the skin cautiously divided till the inner edge of the muscle is exposed; if much developed, the artery will be found overlapped by it; if not, the vessel will be seen to run parallel to, but deeper than the muscle; when the latter conceals the artery, it is to be drawn to the radial side of the arm, to bring the vessel into view.

In tying the radial artery, the operator is frequently very much embarrassed by the median vein which accompanies the artery; it must be kept with a small spatula either inwards or outwards, as may be most convenient, so as to allow a ligature to be passed around the artery.

Radial Artery on the Back of the Wrist.

Pinch up a fold of skin with the fore-finger of the left hand from the excavation, which intervenes between the tendons of the extensor pollicis brevis and abductor longus pollicis on the one part, and the extensor pollicis longus on the other, and with a thin bladed scalpel or bistoury, pierce the fold and cut from within upwards. As soon as the skin is divided, carefully cut through the thick layer of cellular tissue, and expose the vessel.

LIGATURE OF THE ULNA ARTERY NEAR THE WRIST.

Feel for the pisiforme bone, half an inch above which, and on the outer side of the flexor carpi ulnaris muscle, make a straight incision of two inches in extent through the integuments.

Cut through the fascia, an assistant drawing the internal edge of the wound to the inner side; dissect carefully by the side of the tendon, and you will find the artery situated on the outer side of the nerve.

LIGATURE OF THE ULNAR ARTERY AT THE UPPER THIRD OF THE FORE-ARM.

First examine with the finger along the inner side of the ulna the situation and breadth of the ulnaris internus muscle. Then make an incision from above downwards, beginning at the distance of two inches below the inner condyle of the humerus, following the direction of the inner margin of the ulnaris muscle for the space of two inches and a half.

The common aponeurosis is then to be divided, and removing the radialis internus a little from the ulnaris internus muscle, introduce the knife between the latter and the palmaris. On passing the point of the finger through this opening the ulnar artery will be felt.

In passing a ligature round the ulnar artery below its origin, Mr. Guthrie recommends a clean incision to be made through all the muscular fibres that cover it, avoiding the median nerve, as it runs between the two origins of the pronator teres, and then place a ligature above and another below the wound in the artery.

LIGATURE OF THE HUMERAL ARTERY ABOVE THE BEND OF THE ARM.

Begin the incision half an inch above the inner condyle of the os humeri; continue it upwards, along the inner edge of the biceps muscle for at least two inches; when, having cut through the integuments, and generally a little fat, you find the median nerve rising before the artery, which has an accompanying vein on each side.

Pass the ligature under the vessel, from the inner side, by which means the nerve is readily excluded.

To find the humeral artery before it passes over the elbow-joint, we make the patient bend the other arm against a force, to show the expansion of the biceps. Having marked its place, we refer it to the diseased arm, and make an incision along the inner edge of the biceps, or rather, we may say, just where it begins to throw off its tendinous expansion, that is, two fingers' breadth from the inner condyle of the os humeri.

LIGATURE OF THE HUMERAL ARTERY AT THE MIDDLE OF THE ARM.

Make an incision of two inches and a half through the integuments along the ulnar side of the biceps muscle, until the fascia of the arm is exposed, which is to be laid open to the same extent as the skin, by passing a director under it, and on which it ought to be split up. The median nerve is exposed by this incision, and the humeral artery is found situated on its inner side, accompanied by its veins. The ligature ought to be passed from without to within, and care must be taken not to compress the nerve or the veins.

The surgeon must remember, that the artery, when laid bare, does not invariably pulsate, and hence the difficulty of distinguishing it from the accompanying vein or nerve.

If, in performing this operation at the middle part of the arm, in a case of aneurism, two arteries proceeding be met with, side by side, it will not be necessary to include both in the ligature, but first to compress one and then the other, to ascertain which communicates with the tumour, and which ought to be tied.

LIGATURE OF THE LOWER PART OF THE AXILLARY ARTERY.

The patient being placed on his back, the arm removed from the side, and the hand supinated, an incision of about two inches in length must be made over the head of the humerus, between the tendons of the pectoralis major and the latissimus dorsi muscles; this will expose the aponeurosis of the arm. Through this latter structure an incision, corresponding in length, must be made, by passing a director under it, and dividing it with a probe-pointed bistoury.

On separating the lips of the wound, the edge of the coraco-brachialis muscle, median nerve, and axillary vein may be seen. The nerve should be drawn to the radial, and the vein to the ulnar side of the arm, by means of blunt retractors, which part of the operation will be greatly assisted by flexing the fore-arm. The artery will be found behind, to the inner side of the median nerve. A blunt instrument having been used to separate the artery from the adjacent structures, the needle should be introduced from the ulnar side.

LIGATURE OF THE SUBCLAVIAN ARTERY BELOW THE CLAVICLE.

The patient should be placed on a low table, with his body reclining so as to form an obtuse angle, with the thighs and his head turned to the side opposite to that on which the operation is to be performed, and bent gently backwards.

The arm being extended and drawn back, in order to render the pectoral muscle tense, observe the depression formed by the union of the clavicular with the sternal portion of the muscle; it is in this direction that the incision should be made, beginning it half an inch from the sternal end, and on the lower edge of the clavicle, and extending it towards the axilla, about three inches in length.

The two portions of the muscles are to be separated from one end of the incision to the other, following the direction of the muscular fibres. If the interstice does not exist, the muscle must be divided with the bistoury. The arm is now to be brought towards the body, in order to relax the muscle, and by this means to increase the opening. Towards the sternal third of the end of the clavicle we find the vein placed immediately before the artery, which is often hid by a great quantity of fat and cellular tissue. Extreme care is required to avoid wounding the vein; for this purpose we use the handle of the knife, or the finger nail. After having divided the muscle and cellular substance, the artery is raised and tied.

Dr. King recommends an incision parallel to the inferior portion of the internal edge of the mastoid, and following the cellular tissue which separates this muscle from the sterno-hyoid and the sterno-thyroid, in order to arrive on the right side upon the trunk of the innominata and the origin of the subclavian, and on the left side upon the subclavian, before its passage between the scaleni muscles.

Professor Colles says, to lay bare the right subclavian artery before it reaches the scaleni, will not be found difficult by any surgeon possessed of a steady hand and a competent knowledge of anatomy; but I fear, that, with the utmost dexterity, much difficulty will be experienced in passing and tying the ligature around it, even in the most favourable case. This operation, difficult on the right, must be deemed impracticable on the left subclavian artery; for the great depth from the surface at which this vessel is placed, the direct course which it runs in ascending to the top of the pleura, the sudden descent which it makes from this to sink under the clavicle, and the danger of including in the same ligature the eighth pair of nerves, the internal jugular vein, or the carotid artery, which all run close to and nearly parallel with this artery, all constitute such a combination of difficulties as must deter the most enterprising surgeon from undertaking this operation on the left side.

LIGATURE OF THE SUBCLAVIAN ARTERY ABOVE THE CLAVICLE.

An incision of three inches in length is to be made over the upper border of the clavicle, beginning half an inch from its sternal end, or about the outer edge of the sterno-mastoid muscle, and continued in the direction of a line which would terminate at the other end of the clavicle. The platisma and fascia may be successively divided on a director, in the same direction and extent; after which a blunt probe should be employed to tear through the cellular tissue that fills up the triangular interval in which the vessel is lodged. The external jugular vein will be seen lying close to the mastoid muscle, and should be carefully pressed towards the tracheal side of the wound; in some cases, however, the vein lies more outwardly, and may be drawn towards the trapezius muscle. After the division of fascia, the subclavian vein is seen behind the clavicle, alternately swelling and subsiding; when the omo-hyoideus is exposed, the thin fascia which lies behind it, and which is connected to the scalenus muscle, must be torn through, and the index finger is to be passed into the wound to seek for the tuberosity, which is found on the superior and anterior edge of the first rib, the artery being always situated to the outer side of this tubercle.

In applying the ligature, the vessel is to be raised, by passing under it an aneurismal needle, either from behind forwards, or from before backwards; always observing to apply the finger upon the point of the artery opposite to that under which the needle is introduced.

Draw a line from the sternal to the acromial end of the clavicle, and divide it into seven equal parts, three of which are to be allowed for the sternal end, and four for the acromial; if a pin be passed through the point where these two divisions meet, it will transfix the subclavian artery.

Mr. Liston, in describing the operation for tying the subclavian artery, speaks highly of Dr. Colles's spatulas. He says, "Those I used were made of sheet copper; they are so soft as to be bent easily to any shape, which they retain. With them my assistants, whilst their hands were out of the way, were enabled to hold aside the surrounding soft parts on all sides, so as to protect them from the knife, to prevent oozing from the small vessels, and at the same time give me a complete view of the bottom of the wound. These spatulas are of the greatest use in the ligature of all deep-seated vessels, the iliacs, &c., or in any deep dissection whatever."

LIGATURE OF THE ARTERIA INNOMINATA.

The patient should be laid upon the back, the head forcibly carried backwards, in order that the neck may be extended, and the vessels proposed to be laid bare be raised above the edge of the sternum; the face should also be slightly turned towards the left shoulder. The surgeon, placed to the out side of the patient, between the shoulders and the neck, must make an incision, of at least three inches in length, through the integuments, commencing at the middle of the space which separates the two sterno-mastoid muscles, and prolonged towards the right shoulder. This incision must extend about half an inch above the clavicle. Having made a section of the skin and the platysma-myoid, the mastoid muscles must then be divided in the same direction; but in order to divide the sterno-thyroid, it is necessary to insinuate a director under those muscles, so as to protect the origin of the primitive carotid and innominata itself from the action of the bistoury. The whole breadth of these muscles being divided, the operator must lay aside the bistoury, and only use blunt instruments for insulating the artery, such as the scalpel and dissecting forceps, and the grooved director. But if it be necessary to divide any of the sub-thyroid veins, the bistoury must be used for that purpose; or if any of the small nervous filaments, arising from the junction of the hypoglossus and the first cervical pair, be found before the artery, he must also use the bistoury in dividing them, taking the greatest care to insulate them so as to avoid the principal vessels. Great management is also necessary, in insulating the artery at its external and posterior parts, that the lung be not torn. Lastly, when the artery is entirely insulated, the surgeon must glide his armed needle on one side, between the artery, the pneumogastric nerve, and the lung; this done, it only remains to tighten the ligature.

LIGATURE OF THE CAROTID ARTERY ABOVE THE OMO-HYOID MUSCLE.

The chin of the patient being turned to the opposite side, and pushed upwards, so as to extend the parts, an incision, three inches in length, may be made along the inner border of the sterno-mastoideus, beginning below the angle of the jaw, and continued down in the interval between the muscle just named and the side of the larynx. The skin being divided, the platisma is to be cut through to the same extent, and afterwards the cervical fascia, in doing which a portion of the membrane should be pinched up by the forceps, and cut across, so as to make a small opening for the introduction of a director, on which it is to be slit up. This will expose the sheath of the vessels, which is next to be opened, by raising a small portion of it over the artery with a pair of forceps, and dividing it by cautious touches of the knife, held in a horizontal direction. (The sheath which the aponeurosis gives to the artery, the opening of which is one of the most delicate steps of the operation; for if we cut too much outwards, the internal jugular vein may be wounded, if we incise directly upon the artery, we may open the vessel itself; nevertheless, if this sheath be not divided, we almost inevitably include in the ligature, together with the carotid, both the descendens noni and cardiac nerves, which are more or less adherent to its outer surface.) This opening being enlarged, the internal jugular vein will appear distending itself occasionally, so as nearly to conceal the artery. When the sheath has been freely opened, the handle of the scalpel is to be insinuated between the artery and jugular vein, retaining it as closely as possible in contact with the former. By pressing it gently but steadily forward, and by moving it slightly upward and downward while the vein is flaccid, and desisting while it is tense, the artery will soon be detached from its connection with the neighbouring parts on that side. By similar means it is to be separated from its adhesions on the tracheal side. When about half an inch of the artery is completely insulated, an assistant must gently press the vein and par vagum towards the mastoid muscle, and a blunt aneurismal needle, armed with a small firm and round double ligature, may be passed round the artery, taking care to direct it from without inwards, and to keep the end of the instrument close to the vessel, so as to avoid the sympathetic nerve and some of its cardiac branches, particularly the superficialis cordis, which lies internal to the artery and close to the sheath. The ligature being tied, one end of it may be cut off, and the other placed between the edges of the wound, opposite its attachment to the artery; the lips of the wound are to be brought in apposition by means of adhesive plaster. The patient should lie with his head well supported.

LIGATURE OF THE CAROTID ARTERY BELOW THE OMO-HYOID MUSCLE.

The incision through the integuments should commence on a level with the cricoid cartilage and extend for fully three inches down towards the sterno-clavicular articulation. The skin, platisma, and fascia, being successively divided, the head must be slightly elevated, in order to relax the muscles and allow of their being drawn aside so as to bring the sheath of the vessel into view. When this is effected, the subsequent steps are the same as in the operation above the muscle. If we tie the artery in the omo-hyoidean triangle we must depress the omo-hyoideus muscle inward, and when in the omo-tracheal angle it must be pulled upwards and outwards; in this manner we may generally dispense with cutting this small muscle across.

LIGATURE OF THE EXTERNAL CAROTID ARTERY BELOW THE DIGASTRIC MUSCLE.

This vessel may be easily exposed by extending the incision made in the operation above the omohyoid muscle upwards towards the lobe of the ear; and the ligature then applied as recommended above.

LIGATURE OF THE EXTERNAL CAROTID ARTERY ABOVE THE DIGASTRIC MUSCLE.

The chin of the patient being turned to the opposite side, an incision is made through the skin and integuments of the neck from the lobe of the ear to the point of the os hyoides.

> Draw a line from the anterior part of the mastoid process to the centre of the upper bone of the sternum, and another from the side of the body of the os hyoides to a little nearer the sternum than the central part of the clavicle; the artery will be found at the point of decussation of the two lines, and a line passing from that point up to the angle of the jaw will indicate its course.

The edges of the wound being separated by an assistant, the digastric and stylo-hyoid muscles will be seen crossing the artery near the inferior end of the wound. These muscles are to be depressed and separated from the parotid gland with the handle of a common scalpel; this will expose the artery, when a ligature may be passed around it.

LIGATURE OF ARTERIES ABOVE THE TUMOUR.

The patient being properly placed, according to the nature of the disease, an incision is to be made through the skin and common integuments, one or two inches in length, commencing immediately above the tumour in aneurisms of the neck and head, and below it in the upper and lower extremities. Disengage the artery from the cellular membrane that surrounds it, and pass an aneurismal needle armed with a strong ligature below it. Secure as directed.

LIGATURE OF THE SUPERIOR THYROID ARTERY.

The trunk of the superior thyroid may be readily exposed and tied, either in the direction of a line from the corner of the os hyoides to the anterior and inferior part of the thyroid cartilage, or by making an incision obliquely downwards and outwards from the os hyoides to the sterno-mastoid muscle, or lastly by dividing the parts in the omo-hyoid triangle parallel to the sterno-mastoid muscle. In this space the artery, before it reaches the gland, is covered only by the ramus descendens noni, some veins, the aponeurosis, and the common integuments.

LIGATURE OF THE INFERIOR THYROID ARTERY.

The integuments must be divided along the anterior edge of the sterno-cleido-mastoid muscle, then push aside the cellulo-aponeurotic sheath, which encloses the carotid, and look for the inferior thyroid artery a little under and behind the omo-hyoid muscle. In applying the ligature, the two principal nerves which pass before and behind the vessel must not be included, consequently we must vary the method according to the position of the parts. If the nervous trunks be very close to the trachea, pass the needle from below upwards, and from within outwards; but if these nerves be nearer the carotid we should pass it in the opposite direction.

LIGATURE OF THE INTERNAL MAMMARY ARTERY.

Make an incision two or three inches long through the skin, parallel to the margin of the sternum, and by preference, upon the third intercostal space, because it is the widest; then divide the superficial cellular layer, the fibres of the pectoralis major muscle, a thin lamellated tissue which separates it from the intercostal, the most internal fibres of the latter;

finally, a cellular layer of slight thickness, when the artery will be exposed.

The artery lies about three lines from the outer edge of the sternum.

LIGATURE OF THE FACIAL ARTERY.

The patient being seated on a chair, his head secured by an assistant, and the chin turned to the opposite side, ascertain the exact situation of the artery. Pinch up a fold of the skin crossing its course, and cut through it, taking care to avoid one of the descending branches of the facial nerve, which crosses at this point. The artery being exposed it is secured.

It may be easily found by dividing the space between the angle of the inferior maxillary bone and its symphysis into three proportional parts. It runs over the bone one third from the angle and two from the symphysis.

SUPERIOR CORONARY ARTERY.

This vessel is placed three lines above the free border of the lip in the posterior plane of the fleshy fibres, the direction of which it follows; and as the trunk of it is almost in immediate contact with the mucous membrane, its pulsations are readily felt by applying the finger under the lip, and it is more easily wounded in this direction than from the surface.

INFERIOR CORONARY ARTERY.

In order to ascertain the exact course of this vessel, it is sufficient to imagine a curve passing about three lines from the edge of the lip, and terminating at the anterior and inferior part of the masseter.

Hæmorrhage from these arteries may be easily checked by means of a firm compress and bandage.

LIGATURE OF THE LINGUAL ARTERY.

The patient being seated on a chair with his head turned to the opposite side, a transverse incision is to be made through the integuments and fascia from the os hyoides to the mastoid muscle; the edges of the wound being separated, we expose the tendon of the digastric muscle, and below this the lingual nerve; the lingual artery lies immediately below this, and a little posterior to it, or nearer to the vertebræ, and is partially concealed by a lymphatic gland, some veins and cellular tissue.

LIGATURE OF THE TEMPORAL ARTERY.

The patient being placed on his side on a table, bed, or sofa, the operator commences by making an incision one inch or an inch and a quarter long, corresponding with the middle of the space which separates the temporo-maxillary articulation from the auditory canal. The skin having been divided, a grooved director must be inserted under the layers of cellular tissue which cover the artery and vein, and on which they are slit open, as it will be impossible to break this tissue with any blunt instrument.

LIGATURE OF THE OCCIPITAL ARTERY.

The patient is seated on a low chair with his head slightly bent forward and turned to the other side. The operator makes an incision through the skin and integuments half an inch below the apex of the mastoid process, and extends it obliquely upwards and backwards for an inch or an inch and a half. The edges of the wound are to be separated, and the forefinger of the left hand of the surgeon introduced to ascertain the exact situation of the base of the mastoid process, the artery being lodged just below it in the posterior part of the digastric furrow. The next step is to divide the whole thickness of the splenus muscle in the direction of the first incision; the finger will detect the situation of the artery.

In applying the ligature, great care must be taken not to rupture the accompanying veins.

LIGATURE OF THE SUB-SCAPULARIS ARTERY.

Make an incision, parallel to the anterior costa of the scapula, upon the external face of the deltoid, by dividing the posterior border of this muscle opposite to the point of intersection of the teres minor, and the long portion of the triceps; the vessel is easily found by holding the arm very much upwards and backwards.

INTERCOSTAL ARTERY.

The most efficacious method of stopping hæmorrhage from this artery is to cut it across if it be partially divided, and then to apply a plug. When the small size of the wound does not permit the adoption of the plug, its dilatation becomes necessary.

Planch secured the intercostal artery by passing a curved needle armed with a ligature completely round the rib; he then placed a pledget of lint over the wound on the vessel, and included it within the ligature. If the wound be large, an attempt should be made to pass a ligature round the vessel by means of the forceps or tenaculum.

The Plug.—Introduce through the wound into the intercostal space the bottom of a small empty sac made of linen, oiled silk, or a portion of bladder, which should be retained externally by threads; this sac is to be filled with lint, or any other substance, giving it such a size as will prevent its escape through the intercostal space. By this means the compression will act upon the two divided extremities of the artery at the same time, in a certain and exact manner, without much inconvenience to the patient. When the lint is introduced, make a few turns of the thread around the sac, tie it, and fasten its loose extremity to the bandage which covers the wound.

HÆMORRHAGE FROM THE NAVEL STRING.

When bleeding takes place from the extremity of the cord, let a second ligature be applied below the original one, taking care that this second one shall not cut through the cord when drawn very tight, but let it be drawn sufficiently tight to compress the vessels. To ensure success, let it be tied with a portion of a skein of fine linen thread.

LIGATURE OF THE UMBILICAL VEIN AND ARTERIES.

Make an incision along the umbilical vein, in a direction upwards from the umbilicus, taking great care not to wound or include the peritoneum in the ligature.

In some cases it will be necessary to secure the umbilical arteries as well. The operation is performed only in such cases of hæmorrhage as defy all other remedies.

LIGATURE OF THE PEDAL ARTERY.

The foot must be extended on the leg, and supported by an assistant. The operator makes an incision one inch and a half long through the skin and integuments, the anterior extremity corresponding to the posterior part of the first interossial space, and directed obliquely backwards, to terminate at the middle part of the space which separates the two malleoli. Having divided the skin and fascia, the vessel will be found between the tendons of the extensor proprius pollicis pedis, and the first of the extensor digitorum brevis. Pass the ligature under the vessel from within outwards, taking care not to include the nervous filaments (from the tibialis anticus) which accompany it.

Dr. Dorsey's plan for stopping hæmorrhage in the foot:—He applied a compress over the trunk of the anterior, and another over that of the posterior tibial arteries, about two inches above the ankle; over these he passed a strip of sheet copper round the leg, and over this a tourniquet was applied. In this way, when the instrument was tightened, the tibial arteries were compressed, and the bleeding ceased: the copper prevented the tourniquet from compressing any other vessel, so that the circulation in the foot was not interrupted.

LIGATURE OF THE ANTERIOR TIBIAL ARTERY IN THE MIDDLE OF THE LEG.

Make an incision in the middle of the leg two inches and a half in length through the integuments and subjacent aponeurosis, on the outer margin of the anterior tibialis muscle, and the extensor longus of the great toe. In this space, at the depth of about an inch, the anterior tibial artery is found upon the interosseus ligament, accompanied with two veins and the anterior tibial nerve; the nerve generally lies upon the artery. The extensor muscles of the foot being relaxed, and the wound dilated, the ligature can be passed round the vessel with ease,

Sir C. Bell's method of compressing the anterior tibial artery on the fore part of the foot:—Having put down a compress of lint upon the artery, he took two bits of flat stick of eight inches in length, and one inch in breadth; one of these he put on the upper part across the foot, and another across the sole, and tied these ends together. The upper one pressed upon the linen compress, and the cord which tied the sticks together being twisted graduated the pressure. In this manner the circulation of the foot was not impeded, and the compression of the wounded artery was complete.

LIGATURE OF THE POSTERIOR TIBIAL ARTERY BEHIND THE ANKLE.

The patient being placed in the recumbent position, and the leg extended, an incision two or three inches in length is to be made through the skin and the integuments midway, between the malleolus and the tendo Achillis. The integuments being divided, the grooved director must be inserted beneath the aponeurosis, on which it is slit open. The cellular tissue which unites the veins with the artery is very abundant, and is also much more firm and difficult to rupture than in any other part of the course of the posterior tibial artery. This being accomplished, the ligature is passed around the vessel from without inwards to avoid the nerve.

The posterior tibial artery is situated in the same sheath with the tendon of the flexor muscle of the great toe and the principal nerve of the posterior tibial region.

LIGATURE OF THE POSTERIOR TIBIAL ARTERY IN THE MIDDLE OF THE LEG.

The limb being extended on the thigh, the operator makes an incision three or four inches in length through the integuments, on the inner edge of the tibia. The origin of the soleus muscle must be detached from the tibia throughout the whole extent of the external wound. The fascia, which extends from the tibia to the fibula; and covers the deep seated muscles of the leg, will thus be exposed; this fibrous sheath is to be divided to the extent of several inches, and at the distance of half an inch, on the outer side of its attachment to the internal border of the tibia, this incision should be very cautiously made, in order to avoid wounding the vessel with the same stroke of the scalpel: indeed, it is best to make at first only a simple puncture with the point of the instrument, and afterwards introduce into it the extremity of a grooved director, upon which we may enlarge the opening without apprehension.

The artery lies under the fascia upon the tibialis posticus and flexor digitorum pedis muscles.

The tibial nerve is situated on the fibular side of the artery, which lies between two veins.

LIGATURE OF THE FIBULAR ARTERY BELOW THE MIDDLE OF THE LEG.

The leg being extended, make an incision three or four inches in length through the skin and superficial fascia obliquely, from within outwards, and from below upwards, from the external edge of the tendo Achillis opposite the ankle to the posterior and external surface of the fibula, taking care to avoid the vena saphena externa. The index finger of the left hand is passed into the wound under the tendo Achillis, in order to separate it from the deep fascia, which membrane is to be divided to the same extent as the skin; the divided fascia, with the internal edge of the flexor proprius pollicis pedis, is to be held outwards, when the artery will be found at a great depth lying partially on the interosseous ligament, and partially on the bone.

The ligature is to be cautiously passed under the vessel, directing it from within outwards.

LIGATURE OF THE POPLITEAL ARTERY.

The patient must be laid upon the abdomen, and the leg and thigh extended; an incision three or four inches in length is to be made through the skin and integuments, extending from the centre of the popliteal space downwards along the posterior or external margin of the semi-membranous muscle. Having divided the skin and the cellular membrane, the aponeurosis is next opened upon a grooved director to the same extent as the skin, taking care not to wound the external saphena vein; by raising or drawing inwards the edge of the semi-membranosus, the finger will directly feel the pulsation of this artery. Separate the lips of the wound and search for the crural nerve; it must be drawn outwards, when the popliteal vein and artery will be found situated in a considerable quantity of fat at the bottom of the wound. The vein is to be cautiously separated from the artery, and pressed to the outer side; the ligature may then be insinuated under the latter, and tied.

LIGATURE OF THE FEMORAL ARTERY.

The patient being placed in a horizontal position, the operator observes the course of the sartorius muscle, which will be rendered more apparent by turning the knee a little inwards. He then makes an incision through the integuments upon the inner edge, and in the course of the sartorius, commencing it two inches and a half below Poupart's ligament. This incision is to be three or four inches in length, and continued down to the fibres which form the inner margin of the sartorius. The edge of this muscle is then to be drawn a little outwards, and the operator will trace with his finger introduced into the bottom of the wound the pulsation of the artery lying underneath the fascia lata.

At the part where the artery passes under the sartorius the fascia lata is to be divided to the extent of about an inch. The artery is under the fascia, surrounded by its proper cellular sheath; the femoral vein is situated immediately under the artery, the branches of the anterior crural nerve lie outside of the artery, nearer to the thigh bone, and are separated from the artery by firm cellular membrane; sometimes a small nerve passes immediately over the artery under its fascia.

The coats of the artery being fairly exposed, the ligature is passed round it with a common aneurism needle, the point of which is to be kept in close contact with the artery, so as to avoid including the femoral vein or the branches of the anterior crural nerve. The ligature is then to be tied.

Let the surgeon observe the course of the sartorius muscle. For this purpose, he may place the end of a cord on the superior spinous process of the os ilii, and lay it along the inside of the thigh until it reaches the back part of the inner condyle of the thigh bone. Draw a line from the centre betwixt the spinous process of the os ilii and the crest of the os pubis directly down the fore-part of the thigh until it touches the line of the sartorius. Let the point where these lines touch be the centre of the incision, and the direction of it in the line of the artery.

Let the length of the incision be according to the depth of the integuments.

LIGATURE OF THE EXTERNAL ILIAC ARTERY.

The patient is to be placed upon a table, as in the operation for hernia, and his groin being shaved, the surgeon will proceed with a scalpel to make an incision through the common integuments, commencing about an inch from the anterior superior spinous process of the ilium towards the pubis. This incision will be carried for nearly three inches in a line about half an inch above, and nearly parallel to, Poupart's ligament; its inner extremity taking a slight curvature upwards, that it may end over the spermatic cord as it passes through the external abdominal ring.

Mr. Abernethy recommends an incision to be made about four inches in length, commencing about an inch and a half from the anterior superior spinous process of the ilium, and terminating half an inch from the crural arch.

The integuments will be dissected downwards until in a line with the ligament; then upwards for about an inch throughout the whole course of the incision. By this means the tendon of the external oblique muscle is to be cleanly laid bare, and afterwards divided for two inches and a half in the direction of its fibres, the incision terminating a little short of the external abdominal ring. This cut will also take a course about half an inch above Poupart's ligament. The tendon is now to be elevated by the handle of the knife from off the internal oblique muscle, so that the oblique canal may be clearly exposed. This will be found of easy accomplishment; for it is only connected with the parts below by a very delicate reticular membrane, which can be readily broken through.

The spermatic cord will now be seen taking passage towards the external ring from under the edge of the internal oblique muscle, about two inches from the pubis. This part is to be lifted on the finger, in order that its sheath, the cylindrical process of fascia which proceeds from the ring, may be opened. This will be done by lifting the pellicle with a pair of dissecting forceps, and then cutting slightly with scissors or scalpel. When this is accomplished, the little finger of the right hand must be passed into the opening, and the sheath, which will direct it to the internal abdominal ring, immediately behind which will be felt the pulsation of the external iliac artery. The peritoneum will not be found much in the way in this operation. Pressing a little against its angle with the finger will elevate it sufficiently to allow of the artery being secured. An aneurismal needle of silver being now introduced through the internal abdominal ring, it must be insinuated under the artery from its outer side, and moved a little below, that the vessel may be separated from the fascia iliaca with which it is pretty firmly connected, as well as from the iliac vein to which it is also attached. The artery will now be elevated through the ring. This will be accomplished more readily by raising the thigh towards the abdomen; and then a silken ligature of sufficient size is to be passed through the eye of the instrument, that it may be drawn under the vessel.

The artery will now be tied above the going off of the epigastric and circumflexor ilii vessels; and the ligature, when the part is dressed, is to be allowed to remain without the external wound. One or two interrupted sutures may be applied through the integuments; lastly, apply a compress and bandage.

LIGATURE OF THE INTERNAL ILIAC ARTERY.

Divide the integuments and external oblique to the same extent as before pointed out; after which detach the internal oblique and transversalis muscles from Poupart's ligament till within about one inch from the anterior superior spinous process of the ilium. This can be done by cutting upon a director insinuated between these muscles and the fascia transversalis.

The situation of the internal abdominal ring will now be ascertained as in the former operation; and after the finger has been placed within it, the fascia transversalis is to be divided by a bistoury as far outwards from the ring as the muscles have been separated from Poupart's ligament.

An opening from between two to three inches long will now have been made above Poupart's ligament, of which the inner margin of the internal ring will be the boundary towards the pubis.

The handle of a knife or the fingers of the surgeon are then employed to burrow under the peritoneum, in order that it may be elevated as far as that part of the vessel it shall be the surgeon's intention to enclose within the ligature. An aneurismal needle armed with silken thread, and of a very short curve, will next be introduced, while the peritoneum is supported and passed around the internal iliac artery.

LIGATURE OF THE COMMON ILIAC ARTERY.

*Case.**—The first incision commenced at the anterior extremity of the last false rib. Proceeding directly downwards to the os ilium, it followed the line of the crista ilii, keeping a very little within its inner margin, until it terminated at the superior anterior spinous process of that bone. The incision was therefore chiefly curvilinear, the concavity looking towards the navel.

The abdominal muscles were then divided to the extent of about an inch close to the superior anterior spinous process down to the peritoneum; into this wound the fore-finger of the left hand was introduced, and passed slowly and cautiously along the line of the crista ilii, separating the peritoneum from the fascia iliaca, the peritoneum touching the fore-part and the fascia iliaca the back part of the finger. A probe-pointed bistoury was now passed along the finger to its extremity, and by raising the heel of the knife, while its point rested firmly on the end of the finger as on a fulcrum, the abdominal muscles were separated from their attachments to the crista ilii by a single stroke.

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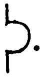
* Dr. Crampton.

By repeating this manœuvre the wound was prolonged until sufficient room was obtained to pass down the hand between the peritoneum and the fascia iliaca. Detaching the very slight connexions which these parts have with each other, I was able to raise up the peritoneal sac, with its contained intestines, on the palm of my hand, from the psoas magnus and iliacus internus muscles, and thus obtain a distinct view of all the important parts beneath; and assuredly a more striking view has seldom been presented to the eye of the surgeon. The parts were unobscured by a single drop of blood. There lay the great iliac artery, nearly as large as my finger, beating awfully at the rate of 120 in a minute, its yellowish white coat contrasting strongly with the dark blue of the iliac vein which lay beside it, and seemed nearly double its size. The ureter, in its course to the bladder, lay like a white tape across the artery; but in the process of separating the peritoneum it was raised from it, with that membrane, to which it remained attached. The fulness of the iliac vein seemed to vary from time to time, now appearing to rise above the level of the artery, and now to subside below it. Nothing could be more easy than to pass a ligature round an artery so situated. The fore-finger of the left hand was passed under the artery, which, with a little management, was easily separated from the vein; and on the finger (which served as a guide) a common-eyed probe, furnished with a ligature of moistened catgut, was passed under the vessel. A surgeon's knot was made in the ligature, and the noose gradually closed.

LIGATURE OF THE AORTA.

Case.[*] — The patient's shoulders were slightly elevated by pillows, in order to relax as much as possible the abdominal muscles; for I expected that a protrusion of the intestines would produce embarrassment in the operation, and was greatly gratified to find that this was prevented by their empty state, in consequence of the involuntary evacuation of the fæces. And here let me remark, that I should, in a similar operation, consider it absolutely necessary previously to empty the bowels by active aperient medicines. I then made an incision three inches long into the linea alba, giving it a slight curve, to avoid the umbilicus. One inch and a half was above and the remainder below the navel; and the inclination of the incision was to the left side of the umbilicus, in this form, . Having divided the linea alba, I made a small aperture into the peritoneum, and introduced my finger into the abdomen, and then with a probe-pointed bistoury enlarged the opening into the peritoneum to nearly the same extent as that of the external wound. Neither the omentum nor intestines protruded; and during the progress of the operation only one small convolution projected beyond the wound. Having made a sufficient opening to admit my finger into the abdomen, I then passed it between the intestines to the spine, and felt the aorta greatly enlarged, and beating with excessive force. By means of my finger nail I scratched through the peritoneum on the left side of the aorta, and, gently moving my finger from side to side, gradually passed it between the aorta and spine, and again penetrated the peritoneum on the right side of the aorta. I had now my finger under the artery, and by its side I conveyed the blunt aneurismal needle, armed with a single ligature, behind it; and my apprentice, Mr. Key, drew the ligature from the eye of the needle to the external wound, after which the needle was immediately withdrawn. The next circumstance which required considerable care was the exclusion of the intestines from the ligature, the ends of which were brought together at the wound, and the finger was carried down between them, so as to remove every portion of the intestine from between the threads. The ligature was then tied, and its ends were left hanging from the wound. The omentum was drawn behind the opening as far as the ligature would admit, so as to facilitate adhesion; and the edges of the wound were brought together by means of a quilled suture and adhesive plaster.

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[*] Sir A. Cooper, Bart.

LIGATURE OF THE EPIGASTRIC ARTERY.

The patient being placed on his back, an incision is made through the skin and integuments about two inches in length, and parallel to the direction of Poupart's ligament, afterwards dividing the aponeurosis of the external oblique upon a grooved director, next by raising and separating the inferior fibres of the internal oblique muscle, when the spermatic cord will present itself to view. We must now trace the superior surface of the latter, which will soon carry us to the aperture in the fascia transversalis, upon the posterior surface of which the artery is always applied, which being torn with the director, or incised with the bistoury, will lay bare the vessel enveloped in a tissue, which is sometimes of considerable density, and accompanied by its two collateral veins.

If the epigastric artery should be wounded with the trocar in tapping the abdomen, it will require neither ligature nor compress, but will cease on the introduction of a piece of bougie into the opening.

LIGATURE OF THE INTERNAL PUDIC ARTERY.

Patient being laid upon the belly, the pelvis resting upon one or two pillows, the surgeon, placed on the side upon which the operation is to be made, desires an assistant to raise the buttock towards the crest of the ilium; he then makes an incision through the skin and subcutaneous layer, commencing it above the base of the coccyx, and terminating it upon the trochanter major; afterwards separating the fibres of the gluteus maximus as far as the sacro-sciatic ligament; then dividing transversely the inferior lip of the wound down to the same ligament, in order that the latter also may be cut without being impeded by the muscular contractions.

This fibrous band being divided, the ligature of the artery would no longer present any difficulty.

On the inner side of the ischium, this artery is about twenty lines distant from the anus.

Plan for securing the internal Pudic Artery when wounded in the Operation for the Stone.—Pass a tenaculum under the trunk of the artery, the point of which comes out near the bottom of the wound: a strong ligature is then passed under the projecting point and handle of the tenaculum and firmly tied; it includes a portion of flesh in which the wounded artery is contained, and effectually stops the bleeding: or pass an armed needle, contained in a pair of curved forceps, under the artery, bringing it out near the bottom of the wound, and then tie the ligature.

LIGATURE OF THE SCIATIC ARTERY.

The same position of the patient and measurement as for the gluteal artery are required, with this difference, that the line should approach nearer the tuberosity of the ischium than the trochanter major of the os femoris, and should be divided into two, in place of three proportional parts, as the artery emerges out of the pelvis at the central point. The incision of the integuments and gluteus muscle should be the same, and fully as extensive.

Be careful not to injure the great sacro-ischiatic nerve.

LIGATURE OF THE GLUTEAL ARTERY.

The patient should be placed on his face or side, and the knee and toes turned inwards; a line then drawn from the posterior superior spinous process of the os ilium downwards, between the tuberosity of the os ischium and the trochanter major of the os femoris, is to be divided into three proportional parts, when the operator may depend on finding the artery emerging out of the pelvis at one third from the spinous process of the os ilium, and two from the centre of a transverse line extending between the mesial of the tuberosity of the os ischium and the tibial edge of the trochanter major. But as an incision would cut obliquely across the fibres of the gluteus maximus, it is preferable to make the incision more across from the sacrum to the trochanter major, in the line of the fibres of this muscle, keeping in view the point where the artery emerges from the pelvis, the extent of the incision depending on the fatness and muscularity of the patients.

ANEURISM FROM ANASTOMOSIS.

A large curved needle, armed with stout silk doubled, is to be passed through the tumour, close to the edge of the swelling.

The needle is to be cut out, leaving the two ends of the ligature of an equal length, and forming two ligatures, one of which is to be tied on each side as tightly as it can be drawn, just in the line of distinction between the tumour and skin.

PUNCTURED ARTERIES.

When a small artery is punctured and bleeds freely, and it cannot be stopped by compression, it will be advisable to divide it completely, so as to allow the extremities to retract; the hæmorrhage will soon cease. If a large artery has been wounded, a ligature must be applied to both extremities, for there is great difficulty in keeping the edges of a punctured artery in contact by the compress.

When arteries are forcibly torn asunder no great bleeding takes place; for the cavities may be much diminished, or even obliterated, from the vessel being so much over-stretched or elongated previous to its giving way.

TORSION OF ARTERIES.

M. Velpeau uses a pair of grooved or even common dissecting forceps. He lays hold of the extremity of the arterial tube, and, carefully separating it from the surrounding parts, applies another pair to the highest point of its insulated portion, for the purpose of fixing it firmly, and at the same time twists the denuded portion of the artery with the first forceps from three to eight times in succession, according to the size of the vessel.

PLATE XI.

SURGICAL MEANS OF SUPPRESSING HÆMORRHAGE.

Fig. 1.—Plugging the nasal fossæ.
a Nose.
b Upper lip.
c Palate bone.
d Nasal fossa.
e Mouth.
f Tongue.
g Section of the lower jaw.
h Lower lip.
i Pharynx.
k Larynx.
l A small piece of curved wire, with an eye, conveying a piece of fine twine into the throat.

Plate II.

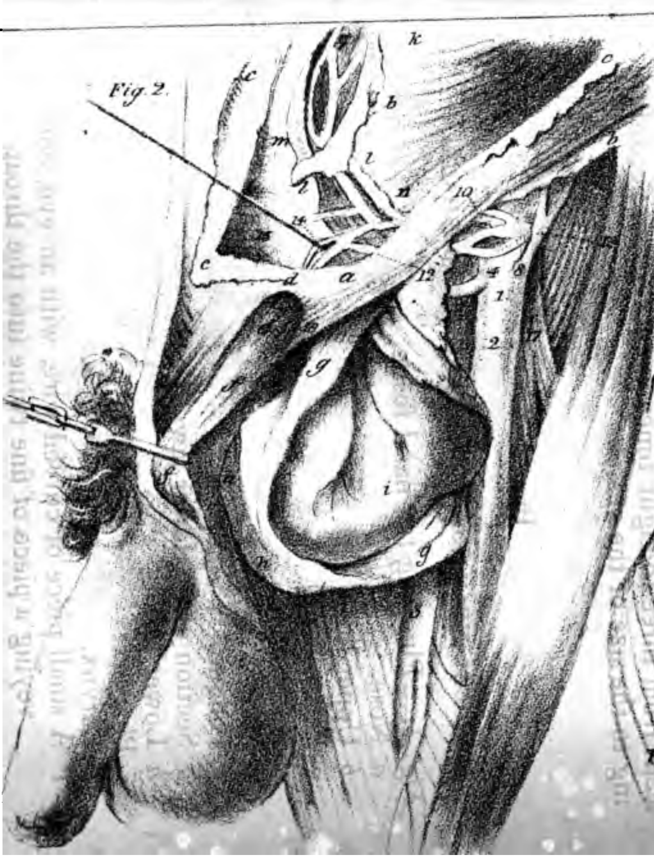
Fig. 2.

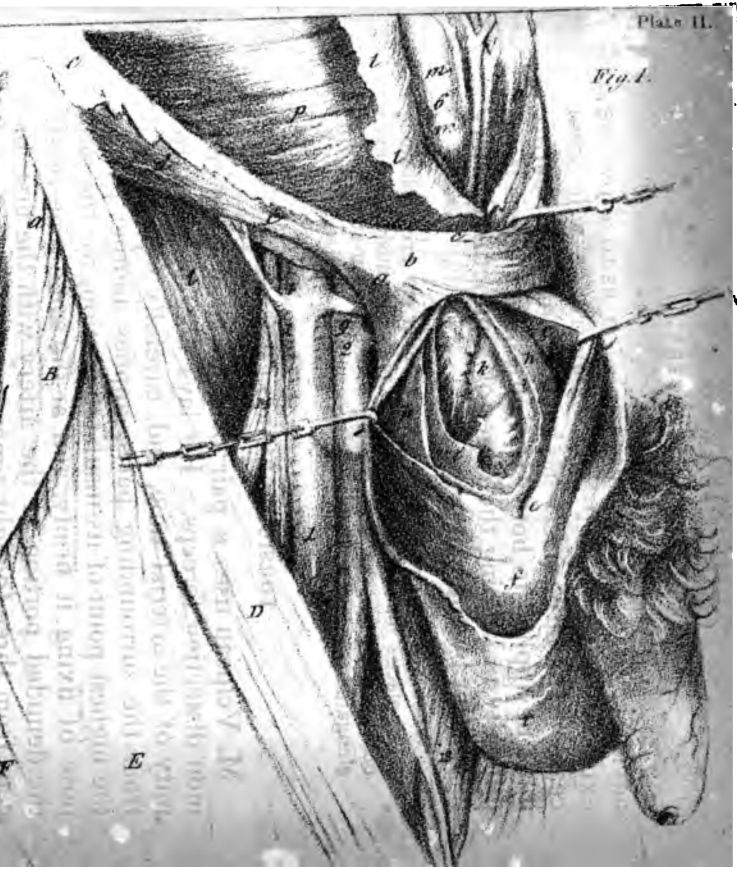
Fig. 1.

Let the length of the incision be according to the depth of the integuments.

LIGATURE OF THE EXTERNAL ILIAC ARTERY.

The patient is to be placed upon a table, as in the operation for hernia, and his groin being shaved, the surgeon will proceed with a scalpel to make an incision through the common integuments, commencing about an inch from the anterior superior spinous process of the ilium towards the pubis. This incision will be carried for nearly three inches in a line about half an inch above, and nearly parallel to, Poupart's ligament; its inner extremity taking a slight curvature upwards, that it may end over the spermatic cord as it passes through the external abdominal ring.

> Mr. Abernethy recommends an incision to be made about four inches in length, commencing about an inch and a half from the anterior superior spinous process of the ilium, and terminating half an inch from the crural arch.

The integuments will be dissected downwards until in a line with the ligament; then upwards for about an inch throughout the whole course of the incision. By this means the tendon of the external oblique muscle is to be cleanly laid bare, and afterwards divided for two inches and a half in the direction of its fibres, the incision terminating a little short of the external abdominal ring. This cut will also take a course about half an inch above Poupart's ligament. The tendon is now to be elevated by the handle of the knife from off the internal oblique muscle, so that the oblique canal may be clearly exposed. This will be found of easy accomplishment; for it is only connected with the parts below by a very delicate reticular membrane, which can be readily broken through.

The spermatic cord will now be seen taking passage towards the external ring from under the edge of the internal oblique muscle, about two inches from the pubis. This part is to be lifted on the finger, in order that its sheath, the cylindrical process of fascia which proceeds from the ring, may be opened. This will be done by lifting the pellicle with a pair of dissecting forceps, and then cutting slightly with scissors or scalpel. When this is accomplished, the little finger of the right hand must be passed into the opening, and the sheath, which will direct it to the internal abdominal ring, immediately behind which will be felt the pulsation of the external iliac artery. The peritoneum will not be found much in the way in this operation. Pressing a little against its angle with the finger will elevate it sufficiently to allow of the artery being secured. An aneurismal needle of silver being now introduced through the internal abdominal ring, it must be insinuated under the artery from its outer side, and moved a little below, that the vessel may be separated from the fascia iliaca with which it is pretty firmly connected, as well as from the iliac vein to which it is also attached. The artery will now be elevated through the ring. This will be accomplished more readily by raising the thigh towards the abdomen; and then a silken ligature of sufficient size is to be passed through the eye of the instrument, that it may be drawn under the vessel.

The artery will now be tied above the going off of the epigastric and circumflexor ilii vessels; and the ligature, when the part is dressed, is to be allowed to remain without the external wound. One or two interrupted sutures may be applied through the integuments; lastly, apply a compress and bandage.

LIGATURE OF THE INTERNAL ILIAC ARTERY.

Divide the integuments and external oblique to the same extent as before pointed out; after which detach the internal oblique and transversalis muscles from Poupart's ligament till within about one inch from the anterior superior spinous process of the ilium. This can be done by cutting upon a director

m A portion of the ligature brought out of the mouth by means of a pair of forceps.
n A plug made of sponge or fine wadding.

Fig. 2.—Nasal hæmorrhage stopped by means of a distended gut.
a The mouth.
b The tongue.
c Lower lip.
d Pharynx.
e Larynx.
f Section of lower jaw.
g Uvula.
h A portion of fowl's gut forcibly distended with water.
i The nostril very much distorted from the swelling of the gut.

Fig. 3.

a The forceps securing the radial artery.
b The tenaculum drawing out the ulnar artery.
c Ligature surrounding the artery.

Fig. 4.—The method of securing a bleeding vessel on the face of a stump with the needle.
a The bleeding point.—Introduce the needle at *b*; bring it out at *c*. Introduce it again at *d*, and bring it out at *e*. The ends of the ligature are to be tied firmly together.

Fig. 5.—To stop hæmorrhage from leech bites.
a b The needles passed through the skin on each side of the wound.
c c Fine thread twisted round the needles.

SPONGE IN HÆMORRHAGE.

The sponge is employed when the injured vessel lies deep, and cannot be come at by incision without endangering some important nerve or large artery, or when the vessel is not in the power of the needle or tenaculum. A piece of dried compressed sponge, cut in size and shape suitable to the wound or incision, with threads tied to it, by which it is to be drawn away in proper time, is thrust down to the bottom of the wound, and fixed with the end of the finger on the bleeding mouth of the artery. Then compress after compress are fixed one above another, until the uppermost rises above the level of the wound. A strict bandage and pressure with the hand complete the whole of this process.

ACTUAL CAUTERY TO BLEEDING VESSELS.

When it is absolutely necessary to use the actual cautery, the iron should be made to approach only to a reddish heat, and should be as thick as can be conveniently admitted, a thin or small iron losing its heat very quickly.

This plan is adopted when the bleeding vessel is so situated that it cannot have a ligature passed round it, or be otherwise compressed.

The heat at which cautery irons are used has a great effect upon their mode of action. It is customary to form some approximation to the degree of temperature by the colour of the irons as they come from the fire.

The lowest degree of the heat is grey, next is dull red, cherry red, yellow red; and lastly white red, which is indicative of the utmost accumulation of caloric. The pain from a cautery iron is much greater when the iron is moderately warm than when it is very hot.

A canula upon some occasions will be found necessary to defend the neighbouring parts, and convey the cautery to the destined place more precisely.

Mr. Cline employed the actual cautery with success in a case of hæmorrhage. After amputation of the leg he cleared away the coagula, tracing the sinus from which the blood proceeded, but was not enabled satisfactorily to see the orifice of the bleeding vessel.

A piece of wire, bent at right angles, was made of the proper heat; and being shielded by a canula, was in this state passed down the sinus, the point touching the part only from which the blood proceeded. The bleeding by this means was restrained, and the patient ultimately got well.

SIMPLE DIVISION OF VARICOSE VEINS BY THE KNIFE.

Having ascertained the precise situation of the vein or cluster of veins from which the distress of the patient appears principally to arise, introduce the point of a narrow sharp-pointed bistoury, slightly curved (the cutting edge being on the convex side), through the skin on one side of the varix, and pass it on between the skin and the vein, with one of the flat surfaces turned forwards and the other backwards, until it reaches the opposite side; then turn the cutting edge of the bistoury backwards, and, in withdrawing the instrument, the division of the varix is effected. The hæmorrhage is easily stopped by a moderate pressure, by means of a compress and bandage.

VARICOSE ENLARGEMENT OF THE VEINS OF THE SPERMATIC CORD.

Lay open the skin over the enlarged coil of veins, dissect round them, and place slips of lint into the wound, so as to keep it open and cause suppuration.

Dr. Fricke treated successfully a great many cases of varicocele and varix by passing a fine thread through the dilated vein, and allowing it to remain from 24 to 48 hours, according to the degree of increased action excited.

TYING OF THE SAPHENA VEIN.

The leg to be operated upon must stand with the inner ankle facing the light, which will expose very advantageously the enlarged vena saphena passing over the side of the knee-joint.

While the patient is in this position, if a fold of the skin, which is very loose at this part, is pinched transversely, and kept in that position by the finger and thumb of the surgeon on one side, and of an assistant on the other, this fold may be divided by a pointed scalpel pushed through it, with the back of the knife towards the limb, to prevent the vein being wounded, much in the same way that the skin is divided in making an issue; this will expose the vein sufficiently. But there is commonly a thin membranous fascia confining it in its situation; and when that is met with the vein had better be laterally disengaged by the point of the knife. This is most expeditiously done by laying hold of the fascia with a pair of dissecting forceps, and dividing it; for it is difficult to cut upon parts which give little resistance, and there is a risk of wounding the vein.

After this a silver crooked needle, with the point rounded off, will readily force its way through the cellular membrane connected with the vein, without any danger of wounding the vessel, and carry a ligature round it.

HÆMORRHAGE FROM THE BURSTING OF A VARICOSE VEIN.

The immediate treatment of hæmorrhage from a ruptured varicose vein consists in applying a graduated compress upon the vein, immediately above and below the orifice, rather than upon the orifice itself, that it may not be irritated by the compress, and securing the compress by a bandage accurately applied.

WOUNDS OF THE SUBLINGUAL VEINS.

M. Petit recommends a piece of ivory, in the form of a short fork, the prongs of which should be so placed as to press against the apertures in the veins, and the other end against the inside of the lower jaw, and should therefore be broad and somewhat convex, that it may keep its place.

INJECTION OF WATER INTO THE VEINS IN CASE OF HYDROPHOBIA.

Having selected a vein, an assistant is to impede the circulation in it, by compressing it firmly about eight or twelve inches above the part to be operated on, so as to cause a dilatation below the point compressed.

An incision is to be made, an inch or an inch and half in length, parallel with the vessel. It being exposed, and seized with a pair of forceps, a longitudinal incision, two lines in length, is to be made into it.

The hæmorrhage, if any, must be suppressed by the assistant, and the operator raises the upper end of the vessel with a pair of dissecting forceps, and with the other hand introduces into the aperture in the vessel the pipe of a very small syringe, containing the distilled water, at the temperature of 25° to 28°. As soon as the vein appears distended with the water below, the compression above is to be removed, and applied immediately over the orifice. From three to ten ounces may be injected, according to circumstances.

TRANSFUSION OF BLOOD.

A good syringe is required, capable of containing two or three ounces of blood, and furnished with a pipe for the vein, about two inches long, and made to fit by plugging and a semirotatory movement into the nozzle of the syringe. The blood is to be drawn into a conical vessel, for example, a tumbler, and while flowing into this vessel, held by an assistant, it is to be absorbed into the syringe, or by removing the piston, it may be drawn into the syringe at once. When charged, the syringe is to be held with its tubular nozzle upwards, and the piston is to be pushed slowly onwards till the blood begins to issue, in order that the air, which from its greater specific levity will rise to the upper part of the instrument, may be thoroughly expelled. The syringe, together with the tube springing from it, now charged with blood only, is to be slid into the vein of the patient, properly laid open for the purpose, and without delay or hurry the blood is to be injected in an equable stream, the operation being repeated as often as the quantity of the blood to be injected may require; the syringe being of a known capacity will measure the blood. When the syringe is charged for the first time, air may be previously expelled from the instrument by charging it with water. The vein must be laid thoroughly bare, as the cellular web, if not divided completely, will slip over the orifice in the vein, and obstruct the introduction of the instrument, and the opening must be made sufficiently large and free to allow of the ready entrance of the tube. The person from whom the blood is extracted should be in good health.

Dr. Blundell says, sixteen ounces of blood for the female system is a large aggregate quantity; eight or ten are more sparing; four or five may, in delicate cases, turn the scale in our favour.

DIVISION OF THE FACIAL NERVE AT ITS ROOT.

The patient is seated or laid on his side. An incision, two inches long, must be made from the back of the ear downwards, in front of the mastoid process.

The edge of the parotid gland will then be exposed on one side, and on the other the anterior edge of the mastoid muscle.

The dissection must be continued between the parotid gland and the mastoid process; the facial nerve will be exposed, and seen crossing this space; raise it on a probe, and cut out a small portion.

EXCISION OF A PORTION OF THE SUBMAXILLARY NERVE.

Make an incision over the side of the jaw, from the semilunar notch to the inferior edge of the bone. The parotid gland being exposed, it must be divided as far back as possible, and turned forwards.

The masseter muscle is next divided in the course of its fibres to the bone; the edge of the knife being turned forwards, some of the fibres are cut transversely, in order to make room over the bone.

A trephine, half an inch in diameter, is then applied half an inch below the semilunar notch, midway between the anterior and posterior edges of the jaw; and the circular piece sawed through is to be removed in two parts, the external table by a lever, the internal one by forceps.

Between these pieces lies the nerve, with its accompanying artery and vein, at the point where they penetrate the bone.

The submaxillary nerve being raised on a probe, half an inch or more of it must be cut out.

Another Way.

Make an incision with a scalpel, from within the mouth, to the extent of an inch through the mucous membrane and cellular tissue connecting the pterygoideus internus muscle to the ramus of the bone, parallel and close to the inner surface of the coronoid process, immediately behind the dens sapientiæ; then take a round-shaped gum lancet, and carry it backwards, in a line continuous with the crowns of the molar teeth, having the cutting edge at right angles with the bone, and divide the nerve on the bone.

EXCISION OF THE INFRA-ORBITAL NERVE.

The head being turned to the opposite side, and supported by an assistant, an incision, one inch in length, is to be made directly over the nerve, from the orbit downwards. Having discovered the situation of the nerve, it must be raised on a probe, and divided near the infra-orbitar foramen.

EXCISION OF THE MENTAL NERVE.

The patient's head being supported by an assistant, the operator, with the fore-finger and thumb of the left hand, turns out the inner side of the lip, and with a small scalpel makes an incision, half an inch in length, through the mucous membrane lining the inner side, immediately below the second small molar tooth, at the dental hole. It must be raised with a pair of forceps, and a small portion of it removed with a round-pointed pair of scissors.

EXCISION OF THE ULNAR NERVE.

Make an incision, two inches in length, above the inner condyle; this will expose the ulnar nerve lying upon the brachialis externus, just before it dips behind the inner condyle. The nerve is to be raised on a probe, and a portion of it removed with a round-pointed pair of scissors.

AMPUTATION.

Amputation is necessary on the principle of sacrificing a part to preserve the remainder,—lopping a branch to save the tree. The necessity being established, we have next to consider the proper time and means. In accidents either from machinery, explosion of gunpowder, gun-shot wounds, bursting of fire-arms, injuries from heavy waggons, coaches, &c., whether accompanied with fractures or not, the first consideration of the surgeon ought to be to decide at once upon the best mode of treatment.

La Dran says, whenever there plainly is a necessity for losing a limb the sooner it is done the better.

As a general rule, it may be observed, that if the principal arteries of a limb are divided, the muscles very much torn, and the bones broken, it is absolutely necessary to perform amputation as soon as

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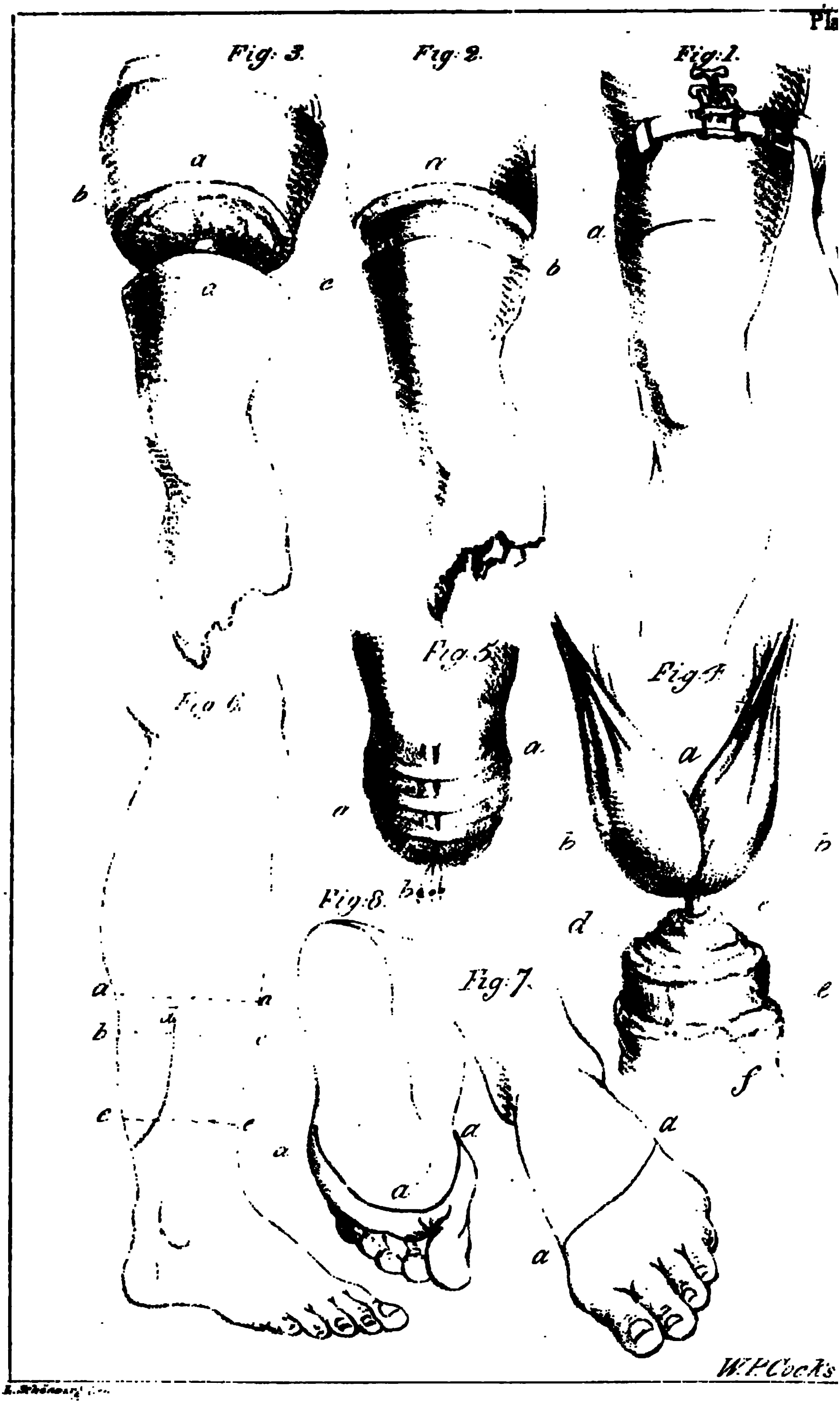


W. P. Cocks

L. Schönberg

possible after the injury, that is, after the patient has recovered the first shock.

If he present directly after the receipt of the injury a cold skin and feeble pulse, the operation must be delayed; but as soon as the countenance brightens, the pulse becomes regular, and he begins to complain of pain and stiffness in the part, the operation may be proceeded with at once. Sometimes the shock communicated to the system is so great that the sufferer remains in a collapsed state for twelve or fifteen hours, others again recover in one or two. When the injury is not so extensive, it will be prudent for the surgeon to save the limb; although a ball has passed through it and fractured the bone, but has not injured any of the principal vessels, all may yet go on well, provided antiphlogistic measures are rigidly enforced during the inflammatory stage. The same applies to laceration of the muscular substance by machinery, waggons, &c.

In cases of diseased joints, tumours, old ulcers, mortification, &c., in all such maladies it is the surgeon's duty to attempt all in his power to save the limb; but if the remedial agents employed prove abortive, the disease increases, and the constitution of the patient be rapidly declining, it becomes an imperative duty on him to remove the source of irritation as soon as possible.

PLATE XII.

AMPUTATION IN GENERAL.

Fig. 1.—Tourniquet applied.

a The manner in which the first incision is made.

Fig. 2.—Second stage of the operation; the integuments are freely divided and considerably retracted.

a a The divided integuments.

b Fascia.

Fig. 3.—Complete division of all the muscles of the thigh.

a Integuments.
b The os femoris.
c Muscles of the thigh.

Fig. 4.

a Anterior part of the thigh.
b The retractor, supporting and protracting the soft parts from the teeth of the saw, when employed in dividing the bone.
c Os femoris.
d d Muscles of the thigh.
e The fascia.
f Integuments.

Fig. 5.

a a Strips of adhesive plaster, keeping the edges of the wound in close contact.
b b b Ligatures.

Fig. 6.

a a The highest circular line where the bones are to be sawn through.
d The course the catling ought to take in the formation of the flap.
e e A circular line, a little below which the catling ought to be brought out.
b c A circular line, made one inch below the superior one, where the integuments are to be divided.
c to *d* Marks the course of the incision through the skin on the anterior part of the leg.

Fig. 7.

a a The course of the incision on the dorsal region of the foot, in amputation at the tarsus.

Fig. 8.

a a a Course of the incision for the formation of a flap from the sole of the foot in the same operation as Fig. 7., which is to be raised up to cover the tarsus when the metatarsal bones and toes are removed.

MEANS EMPLOYED FOR IMPEDING THE CIRCULATION.

In amputations of the inferior extremity we make pressure on the femoral artery at the groin, or by placing a tourniquet round the thigh; and when the superior extremity is to be removed, we press the subclavian artery against the first rib behind the clavical, midway between the acromion process and sternum. The compression may be made with the finger, the handle of a tourniquet, the ring of a common key, or the blade of a stiff spatula, previously covered with a cloth so as to prevent its cutting; or we compress the brachial artery in the middle of the arm.

Dr. Thomson observes, at the moment of cutting through the axillary vessels and nerves, the patient is apt to give an involuntary start, and may throw the fingers of the assistant off the artery, if not prepared for the shock.

TOURNIQUET.

In order to use it properly, a small linen cushion about three inches long, two and a half broad, and about one and a half thick, must be provided, to be applied over the course of the principal artery, and secured by a slip of cloth or roller, to which the cushion is attached, passed two or three times round the limb. The instrument is then to be applied by bringing the strap round the limb and putting it through the buckle as far as necessary, to make an equal and proper pressure, while in adjusting the instrument the handle of the screw is to be placed opposite to the cushion, over the artery; in which case, if properly applied, half a turn of the screw is sufficient completely to restrain any hæmorrhage.

The proper distance for the application of the tourniquet, whether the part intended for operation on be situated above or beneath the knee or elbow, should be nearly the same; namely, a hand's breadth below the groin or axilla.

Having satisfactorily secured all the important arteries of the stump, boldly unscrew the tourniquet, so that the blood may come down with a sort of rush, and you will immediately afterwards see the ligatures in movement by the pulsation of the arteries; then secure any of the smaller ones that may require it. The object in rapidly unscrewing the tourniquet after the large arteries are secured, is that the rush of blood may force any of the secondary ones which may have retracted during the operation into the muscles to bleed; otherwise they may lie concealed and undetected until the patient has been two or three hours in bed, when re-action taking place from the fear of the operation having subsided, and the rallying of the system from the loss of blood and faintness, hæmorrhage comes on, and you are frequently obliged to open the stump to secure the vessel. If not, the blood thrown out forms a large cake, acting as an extraneous body within the lips, preventing union not only by the first intention, but frequently doing much more mischief, particularly if it be in a stump where there has been preserved much integument and too little muscle.—Sir S. L. Hammick.

THE TENACULUM

Is to be used by sticking its point into the coat of the artery, and drawing out the latter for an eighth of an inch, when a ligature is to be pulled over the point of the instrument by an assistant, and when upon the vessel, its two ends drawn gently till the sides of the latter are compressed.

When a ligature is applied, it should be of fine strong silk, and should be drawn tight enough to cut through the two internal coats of the artery.

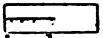
A second knot, if the artery is somewhat large, may be then made, after which the tenaculum is to be removed.

Dr. Veitch says, that each ligature should be drawn out as nearly as possible on a line with the vessels secured, and provided the edge of the adhesive strap, when applied to bring the opposite sides of the wound into contact, forces the ligature from its direct course, it is to be opened carefully with a pair of scissors in the direction of the wound, so that the ligature might be allowed to pass out on a line with the vessel it secured, by drawing it or them gently into this division of the strap. The next strap is to be applied, so as more than to cover and support the extent of the division in the preceding one, and provided it interfered with the direct course of the ligatures from their source (the vessels secured) the same steps are taken. In this manner the wound is closed, and every ligature drawn out as nearly as possible on a line with the point to which it is tied.

Mr. H. Cline, to prevent the slipping of the ligature from the end of the tied vessel, recommends its being passed through the cut extremity of the artery by means of a curved needle.

It is of essential importance in amputation that every artery from which there may be the slightest probability of an after hæmorrhage should be tied previously to bringing into final contact the wounded surface.

RETRACTOR

Is an oblong piece of linen somewhat broader than the diameter of the wound, torn at one end thus  and from eighteen to twenty-four inches in length. As soon as all the muscular fibres are divided to the bone, the linen is applied by placing the exposed portion of bone in the slit, and drawing the ends of it upwards on each side of the stump, so as to protect the soft parts from the teeth of the saw.

SAW.

Before cutting the bone, the operator marks with the thumb-nail of his left hand the place where the saw is to be applied, and then uses that instrument without leaning upon it, drawing it backwards and forwards through its whole length. At first the saw must be moved gently, and kept in its place with the thumb-nail till it has made a groove; it is then to be moved rapidly, but more slowly towards the end, for fear of splintering the bone. At this juncture the assistant should raise the limb to a position as horizontal as possible, though by raising it too much he will confine the saw in its movements; by lowering it too much he will cause the bone to be splintered before it is completely cut through. If the last-mentioned accident happens, the projecting splinter must be clipped off with the nippers.

THE NEEDLE IN SECURING ARTERIES.

The needle being properly armed with wax threads, turn the concave side of it towards the artery to be secured, and then enter the point into the flesh at about a quarter of an inch distance from the lower part, or on one side of the artery, pushing it out at an equal distance from the upper part or opposite side. Carry it then laterally at about the same distance from the artery, pushing it downwards through the flesh in the same manner as before, and then the two ends of the ligatures will hang down. Tie them, and the hæmorrhage will cease.

When arteries are found ossified on amputating, either from age or previously morbid state of their coats from a calcareous deposition, it will be impossible to tie them in the usual way, as they will be found to crumble under the stricture of the ligature. In such cases recourse must be had to the needle.

AMPUTATION AT THE SHOULDER JOINT.

The operator makes an incision through the skin and cellular tissue, which begins at the acromion process and extends to the centre of the axilla, by a gentle curve on the outside of the arm; a second is made precisely similar, only terminating on the inside of the arm. The incisions make the flaps, and guide the future strokes of the knife. Then with a middle-sized amputating knife cut nearly down to the bone on each side; and taking the pointed slip of deltoid which remains attached to the acromion, lay it down quickly with a scalpel so as to expose the head of the bone, which now proceed to luxate. This is done with the greatest ease and certainty by throwing the arm backwards and exposing the long head of the tendon of the biceps; by dividing this tendon and running the scalpel fairly forwards along the groove, its back lying in it as in a director, we are at once conducted into the joint.

The perpendicular diameter of this cavity is much greater than its horizontal, a circumstance to be kept in mind when we disarticulate the arm. It must also be remembered on this occasion, that the coraco-acromial arch is nearly an inch above it; whence it follows that between the summit of the acromion and the lower part of the glenoid cavity there exists a space of about two inches and a half, whilst transversely this space is scarcely an inch.

By carrying the scalpel fairly round, the capsular ligament is divided from the bone. Resume the amputating knife; with one sweep in the axilla the two lateral flaps are united, the limb removed, and the flaps brought together with adhesive straps and bandage.

LIGATURES.

The vessels being secured, and one half of each ligature cut off, the skin is to be drawn over the end of the stump, wiped dry, and carefully approximated; and it is of no importance whether this be done in a line from side to side, or from before backwards. The ligatures are to be brought out at each angle of the wound.

ADHESIVE PLASTER.

Straps of adhesive plaster are now to be applied, in order to secure the skin in its proper situation; over this a pledget of lint, spread with simple cerate, and over this pledget another of fine linen or lint, which is to be secured by a roller.

Second Method.

The operator makes a longitudinal incision, which begins at the acromion and extends downwards about an inch below the neck of the humerus, dividing the integuments and the deltoid muscle into two equal halves. The skin of the arm is then to be pulled up towards the shoulder by an assistant, and the anterior and posterior flaps are to be formed by two oblique incisions, made from within outwards, and at the same time downwards, care being taken that the tendons of the pectoralis major and latissimus dorsi are divided. No fear need be entertained of wounding the axillary vessels, which are out of the reach of the point of the knife. The cellular adhesions of the two flaps are now to be cut through, and the flaps themselves lifted up by an assistant, who must also compress the divided circumflex arteries.

Thus the shoulder joint becomes freely exposed. The knife is then to be conducted round the head of the bone, so as to divide the capsular ligament and tendons of muscles belonging to the joint; the head of the bone is next to be inclined a little outwards, and the knife carried down close to the posterior surface of the humerus, for the purpose of completing the division of the tendinous and ligamentous connexions situated in that direction. An assistant then compresses the axillary artery between his two forefingers, and commands the flow of blood through it, while the surgeon turns the edge of the knife backwards, and cuts through the axillary vessels opposite the lower angles of the two flaps, and just in front of the fingers of the assistant; without remitting the pressure, the axillary artery is readily taken up with a pair of forceps and tied. All that afterwards remains to be done is to secure the circumflex arteries.

The wound having been cleaned with a sponge, the flaps are to be lightly brought together with two or three straps of adhesive plaster, over which the other dressings and a bandage are to be put, according to the rules observed after amputations in general.

Third Method.

The operator, standing on the outside of the patient, makes a transverse incision at the upper and outer part of the arm about three inches below the acromion. The wound is thus carried completely through the deltoid down to the humerus. This having been done, a longitudinal cut is to be made from the point opposite the coracoid process to the anterior extremity of the transverse incision, and this second cut must also divide the deltoid down to the bone. A third incision is to be made behind, reaching from the place where the acromion unites with the spine of the scapula to the posterior termination of the transverse wound. In this way a square flap is formed, that comprises nearly the whole of the deltoid. It is next to be separated from the humerus and raised, so that the shoulder joint may be got at. The posterior circumflex artery may now be found in the back angle of the wound, and as soon as it has been tied the tendons of the teres minor and of the supra and infra spinatus muscles are to be cut through. Then the arm is to be allowed to hang down, and rotated outwards for the purpose of making the sub-scapularis muscle tense, which is to be divided. The next thing is to open the capsular ligament extended over the head of the bone, and at the same time to cut through the tendons, the long head of the biceps, and after dividing the capsule more freely, to dislocate the head of the humerus upwards and outwards. The large knife is now to be laid aside, and a straight bistoury applied to the inside of the humerus, along which it is to be carried downwards, so as to separate the soft parts from it sufficiently far down the limb; but previously to completing the inner flap, by dividing these soft parts, the axillary artery should be compressed, together with a portion of the skin of the armpit, between the fingers and thumb of an intelligent assistant. In this manner hæmorrhage may be prevented, even though the subclavian artery is not compressed. The rest of the operation consists in turning the edge of the knife inwards, cutting through the skin, vessels, &c., at the inner side of the arm, and tying the brachial artery and other vessels requiring ligatures. The flaps are afterwards to be brought together.

CIRCULAR AMPUTATION OF THE SHOULDER JOINT.

The arm is held in the horizontal position, and the axillary artery compressed on the first rib. The surgeon, standing on the outside, makes at four fingers' breadth below the acromion, beyond the insertion into the humerus of the pectoralis major, the latissimus dorsi, and the teres major, a circular incision down to the bone. An assistant with both hands raises forcibly the divided flesh, which readily slips up as far as the joint, and the surgeon may then immediately, at a second stroke, cut the capsular ligament.

Another Method.

Sabatier recommends the surgeon to make a transverse incision down to the bone, a little above the lower extremity of the deltoid muscle.

Two other longitudinal incisions made along the front and back edge of this muscle now form a flap, which must be detached and reflected; lastly, the rest of the soft parts of the limb are to be divided by a circular cut, made on a level with the base of the flap, and the operation finished like a common amputation.

EXCISION OF THE HEAD OF THE HUMERUS.

The patient being seated on a chair, with the arm hanging by the side of the body, and the subclavian artery compressed by an assistant, an incision is to be made commencing from the acromion process of the scapula, nearly in the direction of the fibres of the deltoid, and descending as low as the insertion of that muscle; from this point another incision is to be made upwards and backwards to the extent of three inches, in shape thus V. The flap thus formed is to be dissected from the bone, and held up by an assistant, so that the joint may be exposed.

In detaching the muscles from the head of the bone, the axillary artery may be avoided by taking care to keep the cutting edge of the instrument next the bone, and the back towards the artery. The posterior circumflex will be avoided if, in dividing the attachment of the teres minor, care be taken to keep the knife close to the head of the bone; and the same rule obtains in dividing the attachments of the subscapularis and supraspinatus, with the view to avoid the trunk of the anterior circumflex.

If the hæmorrhage should be troublesome in this stage of the operation, the vessel or vessels are to be secured.

The posterior circumflex artery can be secured before it is divided, which is always found to wind round the humerus, below the insertion of the teres minor, surrounded by a large quantity of cellular tissue; it is invariably accompanied by the nerve.

Be careful not to endanger the long tendon of the biceps muscle.

The capsular ligament and attachments of the scapular muscles being divided, the bone is easily luxated from the glenoid cavity; a piece of stiff Bristol or paste-board must be inserted between the bone and soft parts, which will protect them from the action of the saw.

CIRCULAR AMPUTATION OF THE ARM.

The patient is generally seated on a chair with the arm in the extended position, and supported by an assistant, who can also compress the artery in the middle of the arm, or the tourniquet may be used for that purpose. The skin being retracted, the operator, standing on the outer side of the limb, carries his hand under it, armed with the middle-size amputating knife, and makes a circular incision through the skin and the muscles. The integuments are then to be retracted, but not dissected, from the subjacent parts, as a few touches of the knife are sufficient to divide whatever slips of cellular membrane may connect them to the muscles. At the place where the skin has been reflected the surgeon again applies the knife, commencing external to the biceps muscle, and divides the muscles and vessels, cutting them obliquely upwards. He will find it necessary to make a second incision close to the retracted muscles, to divide the remaining soft parts to the bone; after which he detaches from it the muscles for the space of an inch or an inch and a half, or in proportion to the size of the limb; he then protects the soft parts by a retractor, and saws the bone. The vessels are next to be secured; the principal one will be found internal, and a little anterior to the humerus, and one or two to the external side of the stump.

If the arm be amputated some inches above the elbow, it will scarcely ever be necessary to tie more than the brachial artery and the great anastomitic; on the contrary, if the operation has been performed in the middle of the arm, the brachial profunda superior and media, and sometimes even the nutrient artery of the bone, must be secured.

SINGLE FLAP OPERATION OF THE ARM.

The patient being properly seated, and the arm and fore-arm supported by an assistant in a semi-flexed state, the latter pronated and the artery compressed, the operator grasps firmly between the thumb and fingers of the left hand the integuments and belly of the biceps muscle, and pulls the fold formed by them towards him. He then plunges a small catling through the integuments and muscular substance in the space between the thumb and bone superiorly, and carries it through posteriorly between it and the fingers. He now cuts obliquely downwards and outwards, making a flap of two inches and a half in length; this being accomplished, he divides transversely the space between the two incisions at the back of the arm with a scalpel.

The flap is to be held back by an assistant, and the bone sawn through. Secure the vessels, and bring the flap over the face of the stump.

In operating by the single and double flap the blood vessels are often cut obliquely; sometimes, indeed, they may be seen scooped like a writing pen; and although this may be of no great moment when these vessels are carefully and accurately secured with ligatures, yet this is obviously a division of the vessel which is unfavourable to its retraction and rapid closure, and if in consequence of the faintness of the patient a vessel should not bleed and not be secured at the time of the operation, it may be more liable to secondary hæmorrhage.

DOUBLE FLAP OPERATION OF THE ARM.

The patient being properly placed, and the artery compressed by the fingers of an assistant or the tourniquet, a semi-elliptical incision is made with a large scalpel through the integuments on the outside of the arm, commencing one inch and a half below the insertion of the deltoid, and carrying it round to the centre of the under surface of the arm, so that the apex of the flap will point downwards towards the fingers. As soon as this is completed, an assistant must retract the skin.

The operator then applies the knife close to the retracted skin, and divides the muscular substance down to the bone in the same direction. The inner flap is formed by dividing the integuments and flesh in a similar way, only using a catling instead of a scalpel for dividing the muscular substance on the inside of the arm.

Second Method.

The operator firmly grasps a fold of the integuments and muscles on the outside of the arm to be operated on, with the fingers and thumb of the left hand, so as to put them on the stretch ; he then pushes a narrow catling anteriorly into the space between the fingers and bone, carrying it close to the latter, and through the substance of the arm, until it appears posteriorly. The knife is then made to pass parallel to the bone downwards for a few lines, when its edge is suddenly turned, so as to cut a semi-elliptical flap obliquely outwards.

The catling is again introduced at the same point, and the inner flap is made in a similar way. The flaps are held aside by the retractor, and the bone sawn through. The arteries are to be secured, and the edges of the wound brought together.

FLAP OPERATION OF THE ELBOW JOINT.

Having commanded the circulation with a tourniquet placed on the middle of the arm, the limb is to be supported by an assistant in the supine position. The operator, standing on the inside of the arm for the left, and on the outerside for the right, grasps it with his left hand just above the joint he intends to pierce, and with the right plunges a narrow catling horizontally across the joint in front, and close to the condyles, and carries it downwards and outwards along the fore-arm for a sufficient distance to form a flap from the integuments and muscles situated on this aspect of the limb. He next divides the ligaments, and traverses the joint from before backwards until the knife is stopped by the olecranon.

The integuments are divided posteriorly with one semicircular sweep of the knife. This division being extended to all the soft parts, they must be protected during the sawing through the olecranon process with a metacarpal saw.

EXCISION OF THE INFERIOR EXTREMITY OF THE HUMERUS.

Make two incisions, one on each side of the bone; unite them by a third drawn transversely above the olecranon, representing the letter H. Preserve the ulnar nerve by dissecting it from its sheath, and carry it before the epitrochlea by means of a bent probe, previous to separating the flesh from the anterior part of the articulation; this being accomplished, saw through the bone, at the same time protecting the flesh from the teeth of the saw.

The nerve lies close to the inner edge of the olecranon, and is in danger of being cut if the incision is carried farther than this towards the internal tuberosity of the humerus.

Second Method.

The bone being fairly brought into view by an incision, the flesh is to be separated from it all round, and by the finger, if possible. A needle, which should be blunt at the point as well as on the edges, at the same time that it should be elastic, and adapted in curvature and size to the depth of the wound and the diameter of the bone, should then be taken in the right hand, and its point being brought to touch the surface of the bone on the right side, should be passed behind and in contact with the bone, till, sweeping a half circle, it be felt or seen in contact with the bone at the other side, where it now may be laid hold of and drawn through. While the surgeon is thus employed in passing the needle behind the bone, his assistant should attend to the chain-saw by letting it through between his finger and thumb, so that its cutting edge shall be towards the bone; the saw being brought through, the needle is to be removed and the handles hooked on. The surgeon should now place himself in a position to have the full use of all the muscles of his arms; and having tried the saw gently to see that its side is not to the bone, he should draw one end of it towards him smartly with one hand, and then the other with the other, till it cut the bone through; during which operation the assistant should hold one end only of the bone fixed, for if they press upon both they will lock the saw and retard the operation. The execution of the saw will be found to exceed expectation, for, as it is applied round one half of the bone, its cut is extensive. When, however, the bone is sawed nearly through, the surgeon should either keep his hands farther separated from one another than he found it necessary to do at the beginning, or he should give one handle of the instrument to an assistant and retain the other for himself, that they may stretch out the saw, and thereby make it more like a straight saw as it approaches the anterior surface of the bone, lest being then bent too sharp it break.

CIRCULAR AMPUTATION OF THE FORE-ARM.

The tourniquet is to be placed on the arm, and the patient seated on a form, leaning back against the chest of an assistant, who holds the elbow semi-flexed very securely, and grasps the integuments of the fore-arm, whilst another holds the lower parts by the hand or the wrist, as is most convenient; the fore-arm is maintained half supine, with the integuments on the stretch. If the operation is to be near the carpus, the first incision should go at once down to the bones, the assistant forcibly retracting the parts; and when these are free from the radius and ulna, and drawn upwards an inch and a half, the catling is to be passed between the bones at the upper part of the retraction.

If the knife were inserted lower down, the muscles would require to be slit up from between the bones, by which they would be too much divided, and the interosseous artery would be in danger of being cut too high. The retractor is next to be inserted, the fore-arm pronated, and the bones sawn through, and the vessels tied.

M. J. Cloquet advises a circular incision to be made through the skin; as soon as completed it must be retracted to a sufficient extent, and kept so by an assistant; the operator then passes a narrow-bladed knife, the edge of which is to be directed perpendicularly to the muscular fibres from one side to the other between them and the bones.

AMPUTATION OF THE LOWER THIRD OF THE FORE-ARM WITH THE DOUBLE FLAP.

The tourniquet is applied on the humeral artery, whilst an assistant holds the fore-arm in a middle state, between pronation and supination. The operator stands on the inner side of the arm, holding the part to be removed between the thumb and palm of his left hand. He thrusts the catling beneath the integuments from below upwards, pushing it in at the anterior and inner edge of the ulna close to the bone, and thrusting it on till it appears at a corresponding point on the outer edge of the radius, when he forms a flap half an inch or more in length by cutting towards the palm. He then passes the instrument under the integuments behind the bones, from the point where it came out before the radius to that on the inner edge of the ulna where it was first introduced, and forms a flap posteriorly of the same length as the former.

These two flaps are to be turned back equally to the point of entrance of the knife, where the interosseal ligament, and any muscles or tendons not cut by the incisions for the flaps, are to be divided; the bones are then to be cleared, the retractor run between them, the flaps kept back, and the two bones sawed across at the same time.

The bones of the fore-arm must be held in a state of forced pronation, in order to avoid jarring the articulations of the radius during the action of the saw.

Four arteries generally require ligatures; the radial, ulnar, and two interosseal.

By dividing the ligament which supports the interosseal artery the vessel is readily seized and secured.

AMPUTATION AT THE WRIST JOINT.

The tourniquet being applied to the lower part of the upper arm, the fore-arm is held by an assistant in a state between pronation and supination. After having found the styloid process of the radius and ulna, the operator makes an incision extending from one process to the other, dividing at the same stroke the integuments and the tendons. Then at a second stroke the lateral and posterior ligaments must be divided, the point being used, and being made to follow exactly the curve of the joint. Then pass the knife, cutting freely through the joint; lean it upon the anterior radio-carpian ligament, and direct it towards the palm of the hand. Then cut out an anterior flap of the length of three fingers' breadth; and above all, lest the flap should present a hollowed edge at the palm of the hand, it should be finished by rounding it from within outwards on the right side, and in the reverse direction on the left; that is to say, by making the knife describe a segment of a circle, the centre of which corresponds to the handle of the instrument, and the circumference of which is traced by the point.

Some surgeons prefer making a circular incision through the integuments just below the articulation of the carpus, with the radius and ulna: the flap being dissected and reflected, the tendons, ligaments, &c. are to be divided, and the hand removed by the knife's traversing the joint from the apex of the external styloid process to the internal.

Below the bones of the fore-arm there is a narrow convex part representing the posterior surface of the bones of the carpus, and which unites the hand to the fore-arm. Superiorly this species of neck presents a transverse semicircular groove with superior convexity, which corresponds to the radio-carpal articulation. This groove deserves the greatest attention when we amputate the wrist; because if the knife should fall below it, it would enter between the two rows of the bones of the carpus; if above it, we should be liable to denude the radius and ulna.

EXTIRPATION OF THE METACARPAL BONES WITHOUT REMOVAL OF THE FINGERS.

The first metacarpal bone. The hand resting by its cubital edge on a table, and being held by an assistant, who on one side holds the thumb and on the other the fingers, make on the external edge of the hand along the muscles of the thenar eminence, an incision about four fingers' breadth in length, and passing, by about four lines, beyond the carpian and phalangian articulations of the first metacarpal bone. Separate the lips of the wound, and cut away the attachments of the opponens pollicis with the bone, which is to be removed; divide also, in the inside, that of the first dorsal interosseous muscle, and during this last step of the operation cut very close to the first metacarpal bone, for fear of wounding the radial artery, which is close to the second. Turn aside the tendons of the flexors and extensors of the thumb, but cut away the insertion of the abductor magnus; separate the carpo-metacarpian joint from without inwards, raise the bone with a pair of strong forceps, and finish the operation by dividing the fibrous parts which strengthen the metacarpo-phalangian joint. For the thumb, as well as for the fingers, it is necessary to disarticulate it at the wrist first, and to finish with the other joint; because at the last point the tendons to be kept are nearer where we operate, and are more easily avoided by this method.

In performing this operation, the surgeon should always penetrate through the hand from the dorsal towards the palmar surface, because on the dorsum the bones are easily felt through the skin; they are broader in this direction than anteriorly, and the operator is more certain of making the two incisions depart from the same point and of uniting them upon the anterior surface, so as to have only a single division susceptible of cicatrizing by the first intention.

EXTIRPATION OF THE SECOND AND FIFTH METACARPAL BONES.

Make an incision on the outer side, and rather behind the second metacarpal bone, or within the fifth; for the extraction of the second metacarpal bone, divide the muscles of the second and third interosseal space; for that of the fifth, separate the attachment of the abductor ossis metacarpi minimi digiti, and those of the last interosseous muscles; and lastly, for the extirpation of the bone, proceed as if it were the first. In the removal of the second metacarpal bone you cannot avoid wounding the radial artery.

The articulation of the 5th metacarpal bone is easily found from the surface, by carrying the extremity of the finger along the internal posterior border of the bone. The first prominence met with behind results from the union of its posterior head with the os unciforme.

EXTIRPATION OF THE THIRD AND FOURTH METACARPAL BONES.

Make an incision on the back of the hand between the extensor tendons; carefully cut the neighbouring interosseous muscles, and luxate first, for the reasons just given, the carpo-metacarpian joint, and finish by disuniting the metacarpo-phalangian. In this last step of the operation there is a precaution which must not be omitted, and which is equally necessary to be attended to in the removing the second and fifth metacarpal bones; viz. to leave adherent to the fingers the corresponding portion of the inferior transverse metacarpian ligament; for that, dislocate the metacarpo-phalangian joint from behind forwards, and when the joint is half luxated, raise the bistoury before the head of the bone, so as to cut high up the anterior ligament, which remains united to the phalanx, as well as the transverse ligament with which it is confounded.

It is always easy to discover the metacarpo-phalangeal articulation. The prominence which the metacarpal heads form externally sufficiently shows the place which it occupies; and if the morbid swelling prevented us from seeing this prominence, we should recollect that the joint is always eight or ten lines behind the digital commissure.

CIRCULAR AMPUTATION OF THE FINGER.

The skin should be drawn up by an assistant. The operator, with a common narrow-bladed scalpel, makes a circular incision through the integuments three or four lines in front of the joint. A portion of skin is next to be retracted and assisted back by slight dissection, of sufficient size to cover the stump; the tendons surrounding the joint are also to be divided.

The joint is now bent, and the capsular ligament divided posteriorly; after which the lateral ligaments are to be cut through, as well as the remaining portion of the capsule of the joint.

In amputation or wounds of the arteries of the finger, compression is all that is necessary to stop hæmorrhage from them, without the operation has been performed at the metacarpo-phalangeal articulation; two ligatures will then be required.

AMPUTATION OF THE FINGER WITH THE SINGLE FLAP.

With a straight narrow-pointed scalpel make a semicircular incision across the joint at its dorsal aspect through the integuments, so as to completely open the articulating cavity; divide the lateral ligaments. This being accomplished, carry the knife between the bones at the joint, and cut upwards and outwards from the palmar aspect of the finger, and form a semi-elliptical flap of sufficient size to cover the end of the bone. The diseased portion being removed, the flap is to be brought over the extremity of the joint.

The posterior extremity of the fore-finger receives two tendons, and its articulatory surface is slightly oblique outwards; the knife must be carried between the indicator and middle finger in removing it.

AMPUTATION OF THE FINGER WITH TWO FLAPS.

Let an assistant retract the skin of the finger as much as possible. The operator makes a semi-elliptical incision, passing from the inside lateral surface of the joint, across the dorsal aspect of the finger, to the outside lateral surface of it; the apex of the flap should be formed about two lines above the centre of the joint when the finger is extended. Dissect it back and divide the posterior portion of the capsular ligament, and also the lateral ligaments; traverse the joint with the knife, and cut a flap from the fore-part of the finger upwards and outwards, of the same extent as the posterior one. As soon as the hæmorrhage ceases bring the edges of the wound together.

AMPUTATION OF THE HIP JOINT.

The patient is to be placed in nearly a horizontal position at the foot of the bed, or on a table of a suitable height; the surgeon standing on the inside of the thigh, which is to be removed while an assistant compresses the artery as it passes over the brim of the pelvis.

The femoral artery and vein are laid bare immediately below Poupart's ligament, and secured in the same ligature.

The femoral artery being thus secured, and also a ligature placed above it, to be tightened if necessary, a straight-bladed knife is plunged perpendicularly two inches below the anterior and superior spine of the ilium into the excavation which exists between the fascialis and sartorius muscles. Afterwards, by inclining its point a little inwards, he slides it upon the supra-trochantineal gorge, and in such a manner that the point passes out at the sub-ischiatic groove at the point immediately opposite to its entry.

The cervex femoris is about two inches and a half long inferiorly and one inch only superiorly, between the articular head of the trochanter major, so that there is less space for passing the knife in the latter direction than in the former.

He now cuts obliquely downwards with the knife through all the parts which are to form the inner flap. The flap thus formed is held up by an assistant towards the scrotum, and the joint is exposed; the obturator and some branches of the pudic arteries which are divided in making this flap are to be secured. The articulation being almost denuded in the upper part of this flap, it will be easy to make an incision through the capsule, and dislocate the head of the bone by abducting the limb and dividing the round ligament.

When disarticulating the thigh, it is indispensable to make the section of the capsular ligament very near the margin of the acetabulum.

He next carries the knife upon the outer side of the great trochanter to form the outer flap, the size of which must be proportioned to that of the inner. The arteries being secured, the flaps are to be brought together.

Second Method.

The surgeon, standing on the outside of the patient, and a little below the articulation, seizes the soft parts with his left hand at the external side of the hip joint, and plunges a long catling with a narrow thick blade into the integuments a little below, and external to the anterior superior spinous process of the ilium, penetrating close to the head of the femur until the point appears a few lines below the tuber ischii, which place has been already marked by the operator's eye. While the knife is traversing this course, it is necessary to depress the handle outwards, in order that the point may pass round the great trochanter, and run along the external side of the femur for the space of two or three inches, so as to form the external flap. As soon as it is made it is held back, the assistants apply their fingers on the bleeding vessels, which are instantly tied before proceeding to make the second flap. The surgeon, having with his left hand folded the soft parts inwards, plunges the point of the knife below the head of the femur on the inner side of its neck, one of its edges being directed upwards, and the other downwards; he must take care that the instrument inclined a little upon the belly forms with the surface an angle of about 60°. Then the knife will turn round the neck of the bone, and pass out at the upper and back part of the wound, without coming against the pelvis; the instrument held perpendicular to the surface will pass along the femur for two inches or more, in which he will be guided by the thickness of the limb, for the purpose of forming the internal flap, which is effected by cutting obliquely outwards, observing not to hitch on the lesser trochanter.

When the soft parts are detached from the femur, an assistant introduces his fingers deeply into the wound, and, with the thumb placed upon the skin which covers the back and inner part of the thigh, compresses the femoral artery and profunda; before they are divided all the vessels are to be secured, and both flaps kept elevated.

The surgeon next divides whatever soft parts have escaped the first incisions; then taking the femur in his left hand, he abducts it, cuts through the capsular ligament, and lays open the cavity of the joint, which enables him to divide the ligamentum teres. Whilst going from within outwards he frees the thigh from the external part of the capsule, and any remaining soft parts that may unite it to the pelvis. If the right thigh is to be operated on, we must do it with the left hand. It may, however, be done with the right, but then the surgeon must stand against the body on the side opposite to the joint which is to be operated on.

M. Lisfranc gives the following direction to ascertain the exact situation of the hip-joint under any circumstances. In the first place, if a line about an inch and a quarter in extent be drawn from the apex of the anterior superior spinous process, parallel to the axis of the limb, and another transverse line be drawn from the end of this, it will pass on the outer and anterior surface of the joint, about an inch and a half to the inner side of the former. Second: — A line, half an inch in length, drawn parallel to the axis of the limb, from the anterior inferior spinous process of the ilium, will fall on the superior part of the joint. Third: — If a line, two inches and a quarter long, be drawn from the spine of the pubes, and directed transversely outwards, the joint will be found at a quarter of an inch below its extremity. Fourth and lastly, if a right-angled triangle be drawn, one of the sides of which, about half an inch long and parallel to the axis of the limb, terminates inferiorly on the fore and upper part of the great trochanter, and the other side, of an inch in length, be directed transversely inwards, the superior and internal angle will correspond to the outer side of the head of the femur.

CIRCULAR AMPUTATION OF THE THIGH.

The patient is generally seated on the side of a table, with his back against a mattress or pillow; the tourniquet is applied as high as possible on the course of the femoral artery, or an experienced assistant makes compression against the os pubis with his fingers or a pad. The artery being compressed, the arm of the operator is carried under the limb, till the knife reaches almost round to the same side on which he stands. With one sweep, penetrating to the fascia, the knife is brought round to the point where it first touched the skin, dissecting them back as far as may be thought necessary, for the purpose of covering the stump.

By cutting the first third or nearly so of the circle principally with the heel of the knife, we shall always be enabled to complete the external incision with one sweep of the instrument; a matter of some relief to the patient in point of pain, and of increased facility to the operator, in forming a smooth even edge line.

The surgeon then cuts through the superficial set of muscles, and divides the deeper seated muscles immediately round the bone, at least two inches higher up than the spot at which he commenced his incision through the superficial set.

Dupuytren recommends the muscles to be forcibly drawn up in proportion as they are divided, and reserves the important resource of cutting with the second stroke of the knife those which are adherent to the bone very high up.

The retractor is now applied to defend the muscles from the saw, and the assistants holding the limb above and below very steadily, the surgeon proceeds to saw through the bone.

The arteries to be secured are the femoral profunda and that branch which runs in or by the side of the sciatic nerve.

Allanson's mode of operating.—After having finished the first circular incision, and separated the cellular attachments, the edge of the knife is applied upon the inner edge of the vastus internus muscle, and at one stroke the muscles are cut obliquely through upwards as to the limb, and down to the bone, so as to lay the bone bare about two or three fingers' breadth higher than usual in the common circular incision. The operator then draws the knife towards him, so that its point may rest upon the bone, still keeping the same oblique line, that the muscles may be divided all round the limb in that direction by a proper turn of the knife, during which the point is kept in contact with and revolves round the bone.

A new mode of dressing a stump after amputation of the thigh.—While the assistant draws down with both hands the skin and muscles over the face of the stump, let the surgeon pass a bandage round the pelvis, and roll it regularly and firmly round the limb from the hip to the wound; apply the two cut surfaces neatly together, and retain them there by cross pieces of bandage, secured by a turn or two of the roller; over these put a piece of simple dressing and a pad of soft lint, which are also kept in their place in the same manner, without the use of any adhesive plaster.

AMPUTATION OF THE THIGH WITH TWO FLAPS.

The patient should be placed in a position nearly horizontal on a low table, and properly supported, and the inguinal artery compressed against the os pubis. The operator, standing on the outside of the thigh, commences by grasping firmly in his left hand the soft parts on the inside of the limb; he then plunges a catling through the integuments on the anterior part of it, and passes the instrument through the muscular substance of the thigh to the middle of the posterior surface, close to the bone, and forms the internal flap, two or three inches in length, by cutting downwards towards the knee. The catling is again introduced at the same point anteriorly, and pushed down by the outer side of the bone, passing it out at the same point posteriorly as at first, and forming a second flap in the same direction and of an equal distance.

The flaps are to be pressed upwards by retractors, assisted by the hands of assistants. Saw through the bone close to their base, and secure the vessels.

Placing the finger upon the femoral vein, and keeping it there for five or six minutes, will generally restrain hæmorrhage from it.

Dr. Brunninghausen's method of performing the flap operation.—He says, Take two semilunar pieces of paper, each large enough to circumscribe nearly two thirds of the limb to be amputated. When the place where the bone is to be sawed through has been determined, by a strap of adhesive plaster put round the limb, and when we have judged how much integument will be required to cover the wound, we apply one of the semilunar pieces of paper to the limb. Supposing three inches of integument required to be saved, the paper is to be extended an inch and a half below the plaster.

The other piece of paper is to be applied on the opposite side of the limb, reaching to the same extent below the plaster. The papers are then fixed by a bandage, and firmly pressed by an assistant till the whole of their convex border is closely applied to the skin, so that they cannot be displaced from their situation when the knife is employed. The form of the incision is thus indicated, although not to mathematical nicety, because it is always necessary to allow something for the elasticity of the skin. We now apply the point of a scalpel with a slightly convex edge to the external angle where the two papers are in contact, and cut through the skin along the convex border of the lower paper to the inner angle, and from the inner angle we continue the incision in one stroke, along the convex edge of the upper paper to the outer angle.

The two pieces of paper are now to be taken away, and the flaps with the cellular substance are to be dissected from the parts beneath, as far back as the circular strap of plaster, the assistant taking care not to allow the skin to retract. The two semilunar flaps of integument are now turned back, and retained by an assistant, whilst the muscles are cut through by a perpendicular incision.

In amputation below the knee it will be right to make the semilunar flaps unequal, the posterior flap being a little longer than the anterior, because there is a greater surface to be covered by the former than by the latter, which has only to cover the tibia. After the bones are sawed through, and the vessels secured, the soft parts are to be approximated and supported by a bandage.

CIRCULAR AMPUTATION OF THE LEG.

The patient is to be placed upon a firm table as in the amputation of the thigh; and the leg being properly held by an assistant, while the integuments are drawn up by another, the surgeon, with one quick stroke of the knife, is to make a circular incision about two hands' breadth below the patella, through the integuments, all around the limb.

Dr. Physic makes an incision five inches below the patella in front, extending considerably lower down behind, so as to be more distant from the knee behind than before.

This being completed, the muscles are to be cut through, nearly on a level with the first incision, and down to the bones. The interosseous ligament between the tibia and fibula is to be divided with the catling; and as several of the muscles cannot retract, in consequence of their attachments to the bones, they are to be separated with the knife; and in the same manner the inter-muscular septa, or expansions running between them, are to be divided, as they will still prevent their retraction.

The limb should be a little bent, and the circular incision made with the catling through the skin and integuments to the bone on the fore part, and to the muscles on the outside and back part.

Much attention is necessary, when sawing the bones, not to splinter them. To guard against such an occurrence, and to prevent their protrusion, the fibula ought always to be sawn before the tibia; in order to effect which the surgeon should stand at the inside of the leg, which position will permit him either to saw both bones together or to divide the fibula first. On the contrary, if he stands at the external side, he must fall on one knee, to be in a proper situation to make the section of the fibula before that of the tibia, or depress his hand to such a degree as not to be able to use it but with difficulty. The arteries to be secured are the anterior and posterior tibial, and sometimes the anterior and posterior interosseal. In tying the posterior tibial artery, take care not to include in the ligature the nerve which accompanies it.

These arteries retract very much after the amputation of the leg; so much so that it is frequently necessary, in order to seize the first, to incise the interosseous ligament, and detach it from the bones to a greater or less extent.

FLAP OPERATION OF THE LEG.

Mr. Hay says: — To ascertain with precision the place where the bones of the leg are to be divided with the saw, together with the length and breadth of the flap, I draw upon the limb five lines, three of them circular, and two longitudinal. The situation of these lines is determined in the following manner: I first measure the length of the leg from the knee to the ankle; that is, from the highest part of the tibia to the middle of the inferior protuberance of the fibula. At the midway between these two joints I make the first or highest circular mark upon the leg; this mark is to point out the place where the bones are to be sawn through. At this mark also I measure the circumference of the leg, and thence determine the length and breadth of the flaps, each of which is to be equal to one third of the circumference. In measuring the circumference of the limb, I make use of a piece of marked tape or riband, and place the extremity of this measure upon the anterior edge of the tibia. I will suppose the circumference to be twelve inches; in which case I make a dot in the circular mark on each side of the leg, at the distance of four inches from the anterior edge of the tibia. It is evident that these dots will be found four inches distant from each other, when the measure is applied to the posterior part of the leg. From each of these dots I draw a straight line downwards, four inches in length, and parallel to the anterior edge of the tibia; these lines mark the course which the catling is to take in the formation of the flap. At the extremity of these lines I make a second circular mark upon the leg, which points out the place where the flap is to terminate. Lastly, I make a third circular mark at the distance of an inch below the superior one which was first made; which intermediate mark is designed to direct the circular incision through the integuments on the anterior part of the limb. The course and extent of the different incisions being thus marked out, the operation may be performed with the greatest precision. The catling which is used for the purpose of making the flap ought to be longer than those which are commonly made for a case of instruments; and I push it through the leg a little below the place where the transverse incision is to be made of those muscles which are not included in the flaps. Having placed the limb in a position nearly horizontal, with the fibula upwards and the knee bent, I push the catling through the leg at *d*, and carry it downwards along the course of the longitudinal marks, till it approaches the lowest circular mark, which it joins in the course of the curved line; and the incision then terminates a little below the inferior circular line *e c*. The flap being held back, I divide the integuments on the anterior part of the limb along the course of the circular mark *b d*.

There is always a considerable retraction of the skin after it is divided, if the integuments are in a sound state; and if a proper allowance were not made for this retraction, the extremity of the tibia would be left uncovered, and the flap could not be applied with so much ease to the patient, nor with a certainty of a union by the adhesive process. The muscles which are not included in the flap are then divided transversely, a little below the place where the bones are to be sawn through; but no great quantity of muscular flesh can be conveniently preserved below the extremity of the divided bones, on account of the adhesion of the muscles to the bones; nor is it necessary, as the flap, when made in the middle of the leg, contains a portion of the gastrocnemius and soleus muscles, sufficient to make a good cushion for the extremity of the bones. When the bones are sawn through, it is advisable to cut off a little of the extremity of the conjoined flat tendon of the gastrocnemius and soleus muscles, as it is apt to project beyond the skin when the flap is placed in its proper situation. The large crural nerve is frequently found lying upon the inner surface of the flap. It should then always be dissected out; and when gently extended, should be divided near the extremity of the stump. By this method it will retire so far as to suffer no compression from the flap.

In forming stumps below the knee, the adhesive strap should be applied obliquely, and in such a manner that none of them shall be placed immediately over the ridge of the tibia, upon the cut edge of the bone, else the pressure they occasion is liable to produce inflammation, and ultimately sloughing and ulceration of the thin integuments.

Roux's double flap operation of the leg. — *Case.* — He passed a narrow long knife a little within the edge of the tibia through to the middle of the calf, and made it follow the internal edge of the bone in the direction of the base of the flap, only to avoid the ragged cut which the knife might make in the skin. He made another incision about two inches long within the spine of the tibia, and beginning from the point where he intended to make the section of the bones.

The retraction of the two edges of this wound gave him room to turn the knife more easily along the face and inner edge of the tibia.

The instrument having traversed the calf, the flap was presently completed.

AMPUTATION OF THE LEG IN THE KNEE JOINT.

The patient being placed on his back, and the femoral artery compressed at the os pubis, or in the middle of the thigh, by means of a tourniquet, and the leg supported in a state of extension by an assistant, the operator then plunges a catling behind the patella, in front and below the condyles of the femur, from without inwards for the left side, and from within outwards for the right, carrying it downwards and outwards, dividing the ligamentum patellæ and integuments, so as to form a semilunar flap anteriorly.

The flap is held up by an assistant, and the operator divides the lateral and crucial ligaments. This being accomplished, he carries the knife from before backwards between the heads of the bones, and divides the posterior ligaments. The instrument is then directed downwards and backwards, close to the bone, and a flap of six inches in length is cut from the flesh of the calf.

EXCISION OF THE KNEE JOINT.

Two semilunar incisions are to be made across the fore part of the joint, extending from one lateral ligament to the other, meeting at their extremities, and including the patella between them. If more room be required, it may be obtained by cutting longitudinally at the point of union of the transverse incisions. The patient being laid on his back, the cavity of the joint should be rapidly opened, and the patella removed. The lateral ligaments being next cut, the extremity of the femur may readily be protruded, and as much as seems necessary sawed off. The diseased part of the tibia can be easily taken away, by passing the knife round the head of the bone, so as to detach its connections, and then sawing off a slice of the requisite thickness. The popliteal vessels are little endangered; one or two of the articular branches may require ligatures. The loose pendulous flaps are to be held together by stitches and adhesive plaster, and the whole surrounded with a few strips of lint, and supported by the nine-tailed bandage. The cut ends of the tibia and os femoris are to be retained in apposition, by placing the limb, from the hip to the foot, in a common fracture box, without the double inclined plane, for the limb must be set horizontally.

AMPUTATION OF THE FOOT AT THE CALCANEO-CUBOIDAL ARTICULATION.

The integuments are to be divided about two inches distant from the ankle joint, transversely across the upper part of the foot. The extensor tendons and muscles in that situation are next to be cut down to the convexity of the tarsus. A small incision is then to be made on each side, nearly at right angles with the extremities of the transverse, one commencing below, and a little in front of each malleolus. A flap being thus formed, it is to be drawn upwards by an assistant, but not dissected backwards, the cellular texture being so loose as readily to admit of its retraction. The joints formed between the os calcis and the os cuboides, and the astragalus, with the scaphoides, are now to be opened, commencing with the latter; and the surgeon ought to attend particularly to the eminence on the inner edge of the foot, indicating the attachment of the tibialis anticus muscle to the inside of the os scaphoides, as a guide to the joint.

The articulation between the os cuboides and the os calcis will be found nearly in the same transverse line, but rather obliquely forward. The ligaments being divided, the foot is to be pressed downwards, and a straight knife passed underneath the bones of the tarsus and the metatarsus, until it has separated from them a sufficient quantity of soft parts to make a flap, which when brought up will cover the wound on the fore part, and be in apposition with the edge of the integuments divided by the first incision. It ought to be retained in this situation by two sutures, and by adhesive plaster, compress, and bandage, all of which should be applied from the heel upwards and forwards. The arteries are to be carefully secured, and there will in general be three requiring the ligature, the anterior tibial on the instep, and the external and internal plantar arteries in the sole of the foot.

AMPUTATION OF THE FOOT AT THE TARSUS.

The joints of the metatarsus with the tarsus being well ascertained, an incision is to be made across the foot in the direction of the joints, but from half to three quarters of an inch nearer the toes, and the integuments drawn back over the tarsus.

From the extremities of this incision two others are to be made along the sides of the great and little toe, for about two inches and a half, according to the thickness of the foot; and the ends of these two incisions are to be united by a transverse one down to the bone on the sole of the foot, the corners being rounded off as in plate 12, fig. 8, *a a a.* The flap thus formed on the under part is to be dissected back from the metatarsal bones, including as much of the muscular parts as possible, as far as the under part of the joints of the tarsus.

The metatarsal bones are now to be removed, by cutting into and dislocating each joint from the side, commencing on the outside by placing the edge of the knife immediately above, but close to the projection made by the posterior part of the metatarsal bone supporting the little toe; which prominence is always readily perceived.

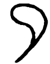
The great object in this operation for its quick performance is to mark out the line of the articulations, which may be always effected by the following rule: — As the tubercle of the fifth metatarsal bone can be always discovered in every foot, it will point out the situation of the joint on this side; if from it a line be drawn at right angles to the axis of the foot to its internal side, about half an inch anterior to the place at which it terminates, the articulation will be found between the first metatarsal and internal cuneiform bones; or if the tendon of the tibialis anticus muscle is very evident, an inch or so anterior to it will also show the articulation.

The arteries are to be secured, any long tendons and loose capsular ligaments are to be removed with the knife or scissors, and the under flap, formed from the sole of the foot, is to be raised up, so as to make a neat stump when brought into contact with the upper portion of the integuments that were first turned back.

EXCISION OF THE ANKLE JOINT.

Two incisions, three inches in length or more, are to be made along the posterior edges of the tibia and fibula, from their inferior extremities upwards; then from the lower ends of these two transverse cuts, in a direction forwards, as far as the tendon of the tibialis anticus on the tibial side, and to that of the peroneus tertius on the fibular side. The flaps being raised, the bones of the leg are exposed, and may be divided by the saw or pliers as high as necessary, after which the separation of their ligamentous connexions is easily effected. The articular surface of the astragalus may, lastly, be readily removed by the cutting pliers. The limb should be gently moved during the cure, to effect a firm fibrous union rather than an osseous one.

AMPUTATION OF THE EXTERNAL OR INTERNAL METATARSAL BONE.

Make an incision round the root of the toe, terminating in a line on the outside of the foot, which is continued down to the joint of the tarsus, thus . The integuments are turned back above and below from the metatarsal bone, which is to be dissected out with the toe attached to it, and the flaps brought together, so as to leave but one line of incision.

AMPUTATION AT THE ARTICULATIONS BETWEEN THE FIRST PHALANGES AND THE METATARSAL BONES.

M. Lisfranc's method of operating. — Supposing it the left extremity to be operated on, and the foot steadily fixed by an assistant, the operator feels for the head of the first phalanx of the great toe, which joins the metatarsal bone, and on it places his left thumb. On the same extremity of the little toe he places his left index finger, the toes resting in the palm of his hand. He then, with a narrow-bladed catling or amputating knife, makes a semicircular incision from the point marked by his thumb to that before his index finger, cutting through the integuments and tendons. By a second cut in the same direction he opens the joint, and bending the toes downwards cuts through the ligaments surrounding the articulation. Keeping the toes still bent, he passes the knife horizontally a little way beneath the under surface of the bones, so as to get clear of the articulations. Then raising the toes, and pressing them upwards, he lowers the handle of his knife, and with the point completes the flap from their under surface by cutting to the commissure of each separately, beginning at the great toe, the assistant raising them in regular order as the knife cuts through the integuments below. In this way a flap is formed of sufficient size to cover the heads of the metatarsal bones and unite with the divided integuments above.

The arteries which require ligatures being tied, the cut edges are to be brought together.

In performing the operation on the right foot, the first incision is made from the little toe inwards, and finished in the same manner, the operator cutting from left to right.

PARTIAL AMPUTATION OF THE JAW BONE.

The patient is seated in a chair in front of a window, the head inclined back against the breast of an assistant, who takes hold of one side of the under lip between his thumb and fore-finger, whilst the operator takes hold of the other side in the same manner with his left hand.

Then with a long narrow bistoury he makes an incision from the middle of the free edge of the lip to the middle of the os hyoides. If the diseased portion of bone be small, this incision will answer the purpose; but if a considerable portion is to be removed it will be necessary to make another incision across the fore and middle part of the chin.

The soft parts are then carefully dissected from the bone from above downwards; the opposite side is dissected in the same way. The periosteum must be removed from the bone where the saw is to be applied; if there be any teeth in the way of the saw they must be extracted. The operator, prior to sawing the bone, frees its internal surface from the soft parts that are united to it by a cautious use of the knife, which he keeps close to the jaw, and then with a chain saw divides the bone upon each side of the disease.

Mr. Liston makes a notch with Hey's saw in the bone at the points where the teeth have been extracted, and then places in the track a strong pair of cutting nippers, and divides the bone with equal neatness and much more rapidly than if the saw had been used.

Some practitioners of eminence recommend the bone to be sawn first, and the soft part to be separated afterwards.

In a case operated on by Dr. Warren, the bone was enlarged quite to the socket, and he was compelled to remove it from the articulating cavity of the temporal bone. This was accomplished by separating the attachment of the temporal muscle to the coronoid process; after which the ligaments were divided, and the bone removed.

AMPUTATION OF THE ENTIRE ALVEOLAR ARCHES OF THE UPPER AND UNDER JAW BONE.

A severe case of osteo-sarcoma of the alveolar arches, with fungus and cancerous ulceration of the corresponding gums.

The head of the patient being secured on the breast of an assistant, who at the same time compressed the facial artery, the operator commenced by dividing the under lip from the top to the bottom, and separating it in a great measure from its connections with the bone. He then ran the knife along the soft parts that lay over the healthy bone, below the level of the alveolar process, dividing them and the periosteum at a sweep; and having drawn the saw two or three times across the anterior and most prominent point of the lower jaw, he took a sharp and strong chisel, and by repeated blows of a mallet, after dividing the soft parts that adhered to the internal surface of the alveolar arch, he detached the entire mass of the osteo-sarcoma. The last grinder of the left side was left, as it appeared, perfectly free of disease. Many were the alveolar arteries that poured out blood, but the hæmorrhage was effectually restrained by the application of the actual cautery, which was freely employed to destroy all suspicious looking points that still remained behind.

The disease of the lower jaw being thus removed, he proceeded to the ablation of that of the upper jaw. The lip being raised by blunt hooks, the knife was carried to the right and left, dividing the gum and periosteum nearly on a level with the palatine arch, and with all caution he ran the saw two or three times along the most prominent part of the bone to procure a groove for the chisel, which being introduced was forced along by the mallet, and the whole superior alveolar arch removed. Here again the bleeding vessels were very numerous, and the same means were employed to stop them. When the hæmorrhage ceased the under lip was united by three twisted sutures, and the common uniting bandage was applied. — *Dr. G. Regnoli.*

WEBBING OF THE FINGERS.

Divide the webbing with a pair of scissors or a scalpel, and keep the parts at a distance from one another by means of oiled lint until they are healed.

OPENING OF DEAD BODIES.

The surgeon is frequently called on to investigate the cause of sudden death, as well as to remark upon the nature of the disease when it ensues after protracted sufferings, and probably attended with anomalous symptoms. This may be required either by the relations of the deceased or by the legal authorities of the country. He is on these occasions expected to furnish a report of his proceedings. It is, therefore, absolutely necessary to have a person present (an assistant or pupil) to take minutes of all the observations desirable to be recorded during the examination; this should not be delayed until the operation is completed, lest some important circumstance escape the memory. Let it be also borne in mind that in instances where the life of an accused fellow-creature is involved, the greatest caution should be used in giving an opinion as to the cause of death in the subject of inquiry. Decency, neatness, and dexterity are essential in the performance of this operation. The surgeon will reflect that in the relations of the deceased and the anxious friends who surround him, he has so many witnesses of his capabilities that he cannot come out of this trial without having confirmed the good opinion he has previously enjoyed, or created an impression either in his favour, or otherwise, calculated to influence his future success in no ordinary degree.

The necessary instruments for this operation are scalpels, an amputating or a carpenter's fine saw, chisel, tripod or blocks, needles armed with waxed thread, sponges, towels, a pail with water, basons, and some vessel to receive the fragments of the viscera during examination when removed from the cavities, chloroid of sodium or lime. It is better at all times to remove the body from the bed or coffin, and place it on a large table or on a form directly opposite to a strong light; but if compelled to make the examination in the shell or bed, care should be taken to avoid soiling the shroud or linen, and the subject must be safe from every unnecessary exposure.

During a private post-mortem examination, if the friends of the deceased be not present, the student should be permitted to perform several of the minor operations, viz. the introduction of the silver and elastic catheter into the bladder, through the nostril and mouth into the œsophagus, also the use of the probang, and the introduction of the common silver probe through the nose into the Eustachian tube or nasal duct, &c.

When opportunities offer, the young surgeon will do well to cut down and expose the various arteries, and practise the application of the ligature. Let him also perform the various operations for hernia, lithotomy, &c., with the same feelings of care and gentleness as if he were operating on the living subject. Be careful not to mutilate the parts unnecessarily. The edges of the wounds are to be brought into contact, and neatly stitched with a fine needle and thread.

HEAD.

The head being elevated on a block placed behind the neck, and firmly held by an assistant, an incision is to be made through the integuments across from ear to ear down to the bone, and the flaps are then dissected and turned over the face and occiput so as to expose the cranium. The temporal muscle must be cut through.

In cutting through the skull some nicety is required; on the anterior part the cut should be made three quarters of an inch above the ridge of the orbit, and behind just above the superior transverse ridge.

On account of the varying thickness of the skull in different subjects, and in different parts of the same skull, care is required in the application of the saw, that its teeth do not penetrate the dura mater. Before the saw is applied, a piece of whipcord may be tied firmly round the skull as a mark for the circular incision. The saw should not be carried through all the tables of the skull; but after having cut the external and middle tables, we should endeavour to break the vitreous one with the chisel and mallet. The skull cap being removed, the head is to be placed on the tripod, and the external surface of the dura mater must be examined. This membrane is now to be divided by a horizontal incision, carried opposite to the ear on both sides, continuing the division forwards nearly to the perpendicular ridge of the occipital bone. The lateral parts of the dura mater may then be turned up towards the longitudinal sinus; this will expose the surface of the brain, the falx cerebri, and the fissure between the hemispheres. The falx must be cut from the crista galli, raised out of the fissure between the hemispheres, and the dura mater turned back. The removal of the dura mater should be done gently; this will expose the arachnoid and pia mater.

The hemispheres being uncovered may be drawn aside so as to expose the corpus callosum, and its substance may be cut through by passing down a scalpel to a level with the corpus callosum, and then directing its edge outwards and upwards so as to avoid entering the ventricle. The ventricle may be opened by making an incision through the corpus callosum parallel with the raphe, and everting the external portion of it. The parts within the body and interior and posterior horn of the ventricle are to be minutely examined; the tentorium cerebelli must be cut loose, and the cerebellum, blood vessels, and nerves within the cranium must be inspected. The fluid being removed with a sponge, the mutilated brain is to be replaced, the skull cap put on, and the scalp drawn into its natural situation, and retained by means of the glover's suture.

FAUCES AND THROAT.

In examining these parts the neck of the subject is to be put on the stretch, and a longitudinal incision made from the point of the chin to the sternum; and the tongue, pharynx, larynx, and trachea, thyroid gland and some of the muscles of the throat, as well as the blood vessels and nerves, are to be removed and inspected.

In cases of infanticide, make an incision from the under lip to the top of the sternum, and another along the lower edge of the inferior maxillary bone; dissect back the integuments on each side, divide the jaw at the symphysis, and separate the two portions of bone. The soft parts attached to it must be divided.

A complete view of the cavity of the mouth is obtained by bending the head back.

THORAX AND ABDOMEN.

Make an incision through the integuments from the root of the neck to the centre of the os pubis. The integuments and muscles are then to be dissected from the ribs on each side to the extent of three or four inches, and the cartilages cut through with a strong-bladed knife as close to the bone as possible.

Having divided the abdominal muscles and diaphragm, which are attached to the ensiform cartilage, the sternum should be raised up, and the mediastinum cut from it towards the face of the subject, and forcibly luxated; this is facilitated by cutting the articular ligament across at its junction with the clavicles. The contents of the chest being exposed are to be minutely examined before they are disturbed with the knife, and notes taken of the various morbid appearances presented externally. This completed, each organ must be examined in situ or removed separately; incisions are to be cautiously made through their substance in various directions, and the morbid appearances noted; viz.

colour, consistence, weight, accidental tissues, blood, pus, &c.

In the fœtus the first incision extends from the lip to the sternum; the second is made from this point, through the integuments, to the superior spinous process of the ilium on each side. The triangular flap thus formed is then to be turned down, and the umbilical vessels examined and tied.

In opening the abdomen some caution is necessary in dividing the peritoneum, because when the intestines are distended with flatus they are very apt to be opened unnecessarily by a hasty or careless incision; to avoid which make a small aperture into the peritoneum at one place, and introduce two fingers, and complete the incision by cutting outwards between them; the cavity being laid open, the viscera are to be treated as above. If the thoracic and abdominal viscera are to be removed together for further examination, the diaphragm is first to be cut down to the spine on both sides. Then, to avoid being incommoded with blood, &c., two very strong ligatures are to be passed round the œsophagus and large blood vessels, in which the trachea may be included, tying them firmly; and then dividing these parts between the ligatures, the same measures are to be taken in respect to the inferior vessels upon the lumbar region, a little above the bifurcation of the aorta, including the vena cava, and also upon the rectum. After having observed these precautions, the viscera with the diaphragm are to be removed by a cautious dissection all the way close to the spine; and by gently drawing them at the same time the separation will be greatly facilitated.

When the thoracic and abdominal viscera are to be taken out separately, in the first case ligatures must be made, as have been described, upon the vessels, &c. just above the diaphragm, and in the other just below it, and upon the rectum. Having completed the examination, the parts are to be neatly and regularly sewed up with the glover's stitch.

Great care is necessary upon all occasions to correct the putrid effluvia, which may be generally done by spunging the parts with a solution of the chloride of sodium or lime. The surgeon should be careful to avoid wounding or puncturing his fingers during the examination; if unfortunate, he must adopt the plan recommended at page 36.

OPENING THE VERTEBRAL COLUMN.

With a carpenter's fine saw cut through the roots of the spinous processes on each side of the vertebræ, and with a strong pair of pincers tear them up. The sheath being exposed, the membranes and substance of the spinal marrow should be examined, with those precautions which have been recommended in dissecting the brain.

INFANTICIDE.*

It is much to be feared that from the ignorance of some and the precipitancy of others great and fatal errors have not unfrequently been committed. It may not, therefore, be improper to present a summary of practical rules for the guidance of the surgeon, when called to the examination of a case which of all others demands a combination of the exercise of the soundest judgment and the most profound knowledge.

1. As a preliminary to any examination of the lungs, the child should be weighed, and the general appearance and condition of the body should be particularly noted, with the view of ascertaining the following points; viz. if the child be full grown, if the different parts of its body be well proportioned, if the shoulders be uncommonly large when compared with the size of the head, if any tumours are

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* *Dr. T. R. Beck's* Medical Jurisprudence.

to be found upon the body, if the cord be unusually short, and, finally, if any symptoms of putrefaction be present.

The Weight of the Fœtus at the full time of Utero-gestation.

Roederer found the weight in 113 cases to vary from seven to eight pounds, rarely less than six pounds.

Dr. Macauley, out of several thousand, found the smallest was about four pounds, and the largest eleven pounds two ounces; but by far the greater proportion was from five to eight pounds.

Dr. I. Clark. The greatest proportion of both sexes weighed seven pounds five ounces and seven drachms.

Dr. Fodere says, the weight is from six to seven and a half pounds.

Hutchison, from five to six pounds.

Dr. Clark of Dublin, from four to eleven pounds.

Dr. Camus, of 1544 cases, the ordinary weight from five to seven pounds.

Dr. Merriman delivered one fourteen pounds weight.

Dr. Croft delivered one fifteen pounds weight.

Dr. Baudelocque delivered one ten pounds weight.

Dr. Capuron has seen two instances of twelve pounds.

Dr. Willoughby, upwards of seven pounds.

Dr. T. R. Beck, from five to eight pounds.

Dr. Magendie, from five to six pounds.

The nature of the situation in which the child is found should be noted, the state of the body as to filth or blood; and if the child has been removed from an exposed situation, it should be recorded whether it be clean or otherwise, and if foul, in what manner it is dirtied, whether with mud, or any thing capable of stopping the mouth or nostrils be found in or about them. The surface of the body is to be minutely examined, in order to detect any ecchymosis, wounds, or punctures, more particularly in or about the fontanelles and sutures of the head; also ascertain the state of the cervical vertebræ and the umbilical cord.

Signs of the maturity of the Fœtus.

The ability to cry as soon as it reaches the atmospheric air or shortly after, and also to move its limbs with facility, and more or less strength. The body being of a clear red colour, the mouth, nostrils, eyelids, and ears perfectly open; the bones of the cranium possessing some solidity, and the fontanelles not far apart; the hair, eyebrows, and nails perfectly developed; the free discharge of the urine or meconium in a few hours after birth; and finally, the power of swallowing and digesting indicated by its seizing the nipple or a finger placed in its mouth.

Progress of Putrefaction.

1st stage. — A tendency to putrefaction. It consists in a slight alteration of the body, a softness of the flesh, and a disagreeable odour.

2d stage. — Commencing putrefaction. A fœtid odour is present; the fleshy parts become light, and assume a dark colour.

3d stage. — Advanced putrefaction. The parts exhale an ammoniacal odour, mixed with a putrid smell. They fall into dissolution, and their colour is constantly altering.

4th stage. — Complete putrefaction. This is known by the complete dissipation of the ammoniacal odour, and also by the putrid smell losing its strength. The volume and weight of the parts are much diminished, and they separate into a gelatinous mucus which gradually dries, and at last becomes an earthy and friable mass.

2. The chest should then be carefully opened, and the following things noticed: the general shape of the thorax,—whether it be much arched or otherwise, if the lungs be collapsed or dilated, whether they cover the lateral parts of the pericardium and heart, whether their colour be deep red or lighter, whether there be any appearance of disease or of putrefaction.

3. The next step is to remove the contents of the chest, for the purpose of performing the necessary experiments upon the lungs. The aorta and vena cava should first be tied near the heart, and then cut beyond the ligatures; the trachea should then be also divided. The lungs, together with the heart, are now to be taken out of the chest, and to be submitted to an additional inspection, to ascertain whether they are sound or diseased, and if they are at all affected by putrefaction.

4. A convenient vessel containing water should now be provided, and particular attention should be paid to the temperature of the water in which the lungs are to be immersed. The reason of this will be perfectly obvious, when it is recollected that the specific gravity of water varies with its temperature; thus, for instance, water at 100° is lighter than water at 60°, and still lighter than at 40°. Besides, if the water be too hot, it will have the effect of expanding

the lungs, and thus favour their floating, especially when there already exists a tendency to putrefaction. If, on the contrary, its temperature be too low, the air-cells may be contracted, and much of the air be thus expelled. The temperature of the water should, therefore, be regulated by that of the surrounding air. Another precaution relative to the water is, that it should not be impregnated with salt; for in consequence of the greater specific gravity of saline water a body might float in it, which would sink in fresh water.

5. The lungs, together with the heart, should then be cautiously placed in water, and it should be observed whether they float or sink; if they float, whether above the surface of the water or just under it; if they sink, whether they do so rapidly or gradually.

6. The lungs should then be taken out of the water; and after tying the pulmonary vessels, they should be separated from the heart, and accurately weighed.

7. The lungs should then be replaced in the water, to see whether they sink or float, and in what way.

8. The two lobes should then be separated, and the same experiment repeated upon each, noticing the difference, if any, between them. If one only floats, see if it be the right one.

9. Each lobe should then be divided into a number of pieces, taking care not to confound the fragments of one lobe with those of the other; and upon each of these the same experiment should be instituted.

10. While cutting the lungs, observe if there be any crepitus, if the vessels are charged with blood, and if there be any traces of disease.

11. If any of the sections of the lungs float, they should be taken and squeezed forcibly in the hand, and then replaced in the water, to determine whether after this they will sink.

Having gone through these different processes, the conclusions to be drawn from them are evident.

If there is nothing to be discovered on the body of the child to favour the belief that it might have lost its life during delivery; if the lungs be not touched by putrefaction, nor be artificially inflated; if on cutting into them a crepitus be perceptible; if the entire lungs, as well as the separate divisions of them, remain on the surface of the water; if after squeezing portions of the lungs they still continue to float, then the mass of evidence is irresistible, that the infant was born alive and enjoyed perfect respiration. If only the right lung or its pieces float, the respiration has been less perfect; if some pieces only float while the greater number sink, it proves respiration to have been still less complete. On the other hand, if neither the entire lungs nor any section of them float in water, the inference is decisive that the child never respired.

A Form for facilitating the record of Post-mortem appearances in the order in which they present themselves.

The blank spaces are to be filled up with the appearances of the parts facing which they stand.

Post-mortem examination of
age disease date by whom performed

General appearance of the external surface of the head, face, eyes, ears, trunk, and extremities.

Head.

Integuments and pericranium - -
Bones of the head - - - - -
Dura mater - - - - - -

Longitudinal sinus
Falx cerebri
Tentorium cerebelli
Falx cerebelli
Sinuses and veins
Arachnoid membrane
Pia mater
Convolution and substance of the cerebrum
Ventricles
Velum interpositum and plexus choroides
Corpora striata
Thalami nervorum opticorum
Commissures
Infundibulum and pituitary gland
Pineal gland
Medulla oblongata
Corpora olivaria
Corpora pyramidalia
Nerves within the cranium
Arteries within the cranium
Medulla spinalis
Substance of the cerebellum

Mouth and Neck.

Lips
Gums
Tongue
Fauces
Pharynx
Œsophagus
Epiglottis
Larynx, external surface
Larynx, internal surface
Trachea
Carotid arteries
Par vagum
Internal jugular veins
External ditto

Chest.

Pleuræ - - - - - -
Cavities of the chest - - - - -
Substance of the lungs on the right side
Substance of the lungs on the left side -
Bronchial tubes - - - - - -
Bronchial vessels - - - - - -
Nerves - - - - - - -
Thoracic duct - - - - - -
Œsophagus - - - - - - -
Bronchial glands - - - - -
Pericardium - - - - - -
Heart: external appearance and size -
Auricles - - - - - - -
Ventricles - - - - - - -
Tricuspid valves - - - - - -
Mitral valves - - - - - -
Semilunar valves - - - - -
Blood in the heart, quantity and colour -
Aorta - - - - - - - -
Art. innominata, subclavian and carotid
arteries - - - - - - -
Pulmonary arteries - - - - -
Veins terminating in the auricles - -
Coronary arteries and veins - - -
Diaphragm - - - - - - -
Thoracic ganglia - - - - - -

Abdomen.

Peritoneal surface of the abdominal and
pelvic viscera - - - - - -
Omentum - - - - - -
Stomach: external appearance - -
Spleen and vessels - - - - -
Stomach: mucous surface - - -
Fluids and solids in the stomach - -
Duodenum - - - - - - -
Hepatic ducts - - - - - -
Gall bladder - - - - - -
Liver - - - - - - -

Pancreas and vessels - - - -
Jejunum - - - - -
Ilium - - - - - - -
Mesentery - - - - - -
Mesenteric glands - - - -
Caput cæcum - - - - -
Colon and rectum - - - -
Kidneys - - - - - -
Ureters - - - - -
Abdominal aorta and its branches -
Vena porta, cava ascendens and its branches - - - - - -
Abdominal ganglia - - - -
Nerves of the viscera - - - -

Pelvis.

Bladder: external appearance and size -
Vasa deferentia - - - - -
Prostate gland - - - - -
Cowper's glands - - - - -
Mucous surface of the bladder - -
Urethra - - - - - -
Penis - - - - - - -
Ovaria - - - - - -
Fallopian tubes - - - - -
Broad and round ligaments - - -
Uterus: external appearance and size -
Uterus: mucous surface - - -
Vagina - - - - - -
Iliac arteries - - - - -
Iliac veins - - - - - -
Nymphæ - - - - - -
Clitoris - - - - - -

The foregoing is a true and correct report.

(*Signed*)

It frequently happens that a post-mortem examination is conducted under circumstances which render it extremely difficult to put on record a faithful history of all that is really desirable or even necessary to be known. The difficulty may arise from the want of a competent person to write the details, as they are given *vivâ voce* by the anatomist, or it may be that his mind is drawn off from the subject by the observations of those around him to such a degree as to prevent that coherency in his statement which is an essential quality in all such documents. It appears to the author that the method of arrangement introduced will very much conduce to lessen these evils; for as the regions of the body, and then the different tissues, are brought into view in regular order, it will be very possible for the operator to make his own notes, or at least it will enable him to detail to his amanuensis with a degree of congruity which will scarcely require any subsequent labour to render the statement fit for the public eye; and where judicial proceedings are contingent upon his report, the saving of even a few minutes of time may be of the utmost importance.

The form of a certificate affixed will remind the medical man of the necessity of giving validity to his statement by such a document. The report once agreed to, and signed by the parties present, will prevent any subsequent dispute as to the state of the case.

It may be useful to suggest, that where death by poison is suspected, in order to the more perfect examination, the stomach and œsophagus should be carefully removed. For this end, tie a ligature around the cardiac and pyloric extremities while *in situ*, and, with as little delay as possible, let the chemist commence his analysis of the fluids; which done, investigate very minutely the state of the membranes.

PRESERVATION OF WET MORBID SPECIMENS.

All specimens of diseased parts should be carefully removed from the body, with a small quantity of the surrounding substance, and enveloped directly in its bloody state in a piece of cotton or linen cloth, sufficiently large to contain the whole mass; secure the ends of the cloth with a portion of twine; to which must be affixed a small wooden label with a number cut on it, corresponding with the number in the note book. Thus secured place it in a saturated solution of the sulphate of alum in a stone jar, and allow it to remain for a week or two; at the expiration of this time take it from the jar, remove the cloth, and examine it well by a careful dissection. Having arranged it in such a manner, with small portions of broken thermometer tubes, so as to show the diseased structure to advantage, and having dipped it several times in clean distilled water, it must be placed in a filtered saturated solution of alum in a glass jar of a proper size, and secured. Cow or horse hair is much better for suspending them than silk or twine. Place a piece of good box-wood or ebony, one-fourth of an inch in breadth, and one-sixteenth in thickness, (or if the specimen be large the wood must be thicker,) and in length according to the size of the jar, immediately across the centre of its mouth; secure the ends with a very stiff solution of India rubber to the edge of the glass, the latter having been previously ground on a marble slab with fine sand and water; put a second piece of wood of the same size across the middle of the former piece, and secure it in the same way. To these cross bars suspend the specimen, which being properly secured, the edge and neck of the glass must be coated with the solution of India rubber. A portion of very thin sheet rubber is then to be drawn smoothly and tightly over it, and firmly secured by good surgeon's twine wound round the neck several times; around this apply two or more coats of spirit or oil copal varnish.

Drying Compound Varnish.

Take spirits of wine one pound, purified mastich four ounces, gum sandarac two ounces, very clear Venice turpentine two ounces, glass coarsely pounded four ounces. Reduce the mastich and sandarac to fine powder, mix this powder with glass from which the finest parts have been separated by means of a hair sieve; put all the ingredients, with the spirit, into a short-necked matrass, and adapt to it a stick of white wood, round at the end and of a length proportioned to the height of the matrass, that it may be put in motion.

Place the matrass in a vessel filled with water made at first a little warm, and which must afterwards be maintained in a state of ebullition for one or two hours. The matrass may be made fast to a ring of straw.

Compound Copal Varnish.

Take pounded copal of an amber colour six ounces, gum sandarac six ounces, mastich two ounces, clear turpentine two ounces, pounded glass four ounces, spirit of wine thirty-two ounces, camphor one ounce.

Mix these ingredients, and pursue the same method as that directed above.

Two drachms of powdered corrosive sublimate of mercury added to one pint of the above will preserve dried anatomical subjects from insects.

Copal Varnish.

Take of fine gum copal reduced to a powder and powdered glass, of each one ounce, put them into a pint bottle, then pour in three ounces of rectified spirits of wine, and continue constantly to shake them briskly together until the gum loses its tenacity, and the glass will subside freely to the bottom, which, and the spirits assuming a yellow colour, is a sufficient criterion that the gum is dissolved and received by the spirits; then let it stand until it becomes fine and transparent, when it may be decanted off for use.

If the parts be corrugated or hardened, they must be soaked for a few hours in distilled water. The colours are fastened, and the specimen presents an appearance not to be surpassed, if equalled, by those of any museum in Europe.

Subjects for the dissecting rooms may be preserved by injecting the solution once a day for a week into the aorta, allowing the stop-cock (made of box-wood) to remain in the vessel during that time, also filling the stomach, lungs, and intestines. The cavities of the chest, abdomen, and pelvis are to be filled from the incision made to expose the heart.

Make an incision through the integuments the whole length of the sternum, then with a saw divide the sternum longitudinally into two equal parts; introduce a dissecting knife under the divided bone on each side, separate it from the mediastinum, and lay open the thorax by bending back the two portions of the sternum and the cartilages of the ribs; an incision is then to be made into the pericardium and the left ventricle of the heart, and a large pipe introduced into the aorta, and secured by a ligature.

Subjects so prepared and immersed in the solution will keep for years, and in any climate; parts partially dissected may be thrown into the pickling tub, and the operation resumed at any future day, without the slightest injury to it. Another quality of the solution is, the muscular substance keeps its colour as well as all the other parts. In making the solution it will be necessary to use clear rain water for the pickling tub, and distilled water for the glass jars for the museum. The jar or pan must have an earthen or wooden coverlid, so as to prevent evaporation or the admission of dust or flies.

THE METHOD OF MAKING ANATOMICAL PREPARATIONS.

Sir C. Bell says, in his System of Dissections, to those who are commencing their operations, small subjects will be found the most convenient, being more easily managed, and not likely to embarrass the student with much confusion. Besides, his views at first should not be so immediately directed to practice; his object should rather be to acquire general ideas of anatomy. Young subjects are likewise much fitter for injection, (I mean for the injection of the arteries, and for minute injection;) they are not only more easily heated and managed, but, what is of more consequence, their blood-vessels have an elasticity and strength which enables them to bear the push of the injection better, and, by a kind of elastic resistance, to give warning of the danger of rupturing their coats; while in old bodies the piston of the syringe goes easily down so far, stops, and if forced most probably bursts the vessels, driving the injection amongst the muscles, and giving much trouble in the dissection. When any of the trunks burst in this way, the tension being taken off, their coats contract upon the warm injection, and they remain half filled.

In old age this want of pliancy becomes very remarkable. There is often a kind of stiffness and rigidity, as if the coats of the vessels were corrugated; a degree of that state in which we find arteries when ossified, or when concretions are formed in their coats. If only some coarse injection is in a slovenly manner to be thrown into the great vessels to show their course, it does not much signify how it is done, or what injection is used, or what means are employed to facilitate the passage of the injection.

> The part to be injected should be freed from its blood as much as possible, by steeping it for several hours in warm water, and repeatedly changing it. This being accomplished the pipes are to be fixed in their proper vessels, and all other vessels to be tied with a ligature.

But if the vessels are to be injected minutely, it is necessary previously to heat the subject well by bathing it in warm water, or applying steam to the surface.

> The heat of the water is to be gradually increased to the same temperature with the injection to be thrown in. The injecting syringe should be steeped in the water, with the part to be injected, until wanted. If the veins are to be injected, three pipes are required: one to be put into the angular vein, at the corner of the orbit, another into a vein as near the fingers as possible, and the third into a vein as near to the toes as possible.

This is of more consequence than even the choice of the subject; for as the injection is intended to be penetrating and fluid when warm, and upon becoming cold to congeal and remain solid in the vessels, it is necessary that the vessels be heated, that they may not suddenly chill the injection; besides, this heating of the body softens and relaxes all the mass of flesh, and brings it to a more suitable state for admitting injection. But it ought to be remembered, that if the parts be overheated, especially where the vessels to be injected lie exposed, there is danger of spoiling all by corrugating their coats, and making them quite friable and tender. There is a better way still of heating the subject, viz. by heating the vessels themselves, and, indeed, the two methods should be always combined. The common practice in the injection of the great vessels is to inject first equal parts of brown and white spirit varnish, coloured with the same paint that is used for the coarse or wax injection, and this fine varnish injection being moderately heated, and thrown in before the wax injection, clears its way, and moderately heats the vessels, so that they do not readily cool or retard the wax injection which is to follow. But when using minute injection, (which is size coloured with vermilion,) for the purpose of demonstrating the minute vessels, although the hard injection is thrown into the vessels after it, simply to stop the regurgitation of the warm and liquid size, and to retain it in the minutest extremities of the vessels, yet it infallibly happens that the wax injection runs more minutely in this way than in any other. This being the case, it will be found in all cases to be a better method to use painters' size, coloured with vermilion, and heated, but not so much as to crisp the vessels, and to throw it in before the coarse injection.

It is the least expensive, runs more minutely, gives always a chance for beautiful specimens of minute injection, and can be pushed to any quantity, even till the skin of the limb becomes quite tense, without rupturing the vessels, or those vessels at least by which the coarse injection can escape. By this means the vessels are dilated, the limb made warm and moist, and the wax injection flows easily into the arteries, whilst the size escapes with the slightest pressure into the cellular texture.

There are still other things which require attention, viz. the tying of all the collateral vessels that may have been opened, and the fixing of the tube securely in the mouth of the vessel. When the injecting pipe is introduced into the vessel, it cannot be retained there by a simple knot, without a chance of its slipping off during the injection, or, if tied firmly, of cutting the coats of the vessels. Therefore, after the ligature is drawn upon the artery, including the tube, the ends of the ligature should be brought over the wings of the tube, and then carried round so as to include that part of the ligature which reaches from the mouth of the tube to the wing, and being tied there, the former knot is tightened, and the mouth of the artery drawn up upon the barrel of the tube. The coarse injection is composed of the following ingredients: — bees' wax, six ounces; resin, eight ounces; turpentine varnish six ounces.

The wax and resin give hardness and consistency, and the varnish is added to give it pliancy. These colours are generally used: vermilion, king's yellow, chrome yellow, flake white, Prussian blue, smalt, verditer, verdigris, lamp black. They should be mixed with turpentine varnish, and then added to the wax when melted; and should there be occasion to melt the injection a second time, the heat must be cautiously applied, lest the colours should be burnt and destroyed. The injection should not be thrown into the vessels while too warm, for it will hurt their coats.

Turpentine Varnish.

Thin Venice turpentine by adding to it as much spirits of turpentine as will reduce it to the consistence of a syrup. Stir them well together with a wooden spatula.

The degree of heat should be such, that the finger can be allowed to remain in it for a little while. A coarser composition can be made with tallow, wax, spirit of turpentine, and oil, coloured with the coarse paints, or simply tallow and red lead, when the parts are not to be preserved.

Mix up a quantity of red lead with boiled linseed oil to a thicker consistence than is generally used for painting. — To this mixture of red lead and oil, add turpentine varnish until the composition is about the consistence of common thick oil, and also add a little spirits of turpentine, which makes it run better, in this state the compound is injected, there being no necessity for heating the body or injection. It will become hard in the course of the day.

For minute injection, turpentine, coloured with vermilion, (which Haller preferred to all other injections for running minutely and without extravasation,) painters' size, coloured with any of the above paints, or equal parts of brown and white spirit varnish,

Brown Hard Varnish.

Take black resin one pound four ounces, dissolve it in an earthen pipkin over the fire, remove and add spirits of wine three pints, and white hard varnish two quarts. Mix them well with a wooden spatula.

White Hard Varnish.

Take gum sandarac one pound, yellow resin one pound, spirits of wine two quarts, powdered glass four ounces. Prepared as above.

When delicate membranes are to be injected, either with quicksilver or with fine size, instead of tying all the vessels by which the fluid may escape, I have found it necessary only to sear the edges of the membrane with a heated iron, or after having fixed the tubes, the common method is to dry the edge all round, while the middle part is kept soft and moist.

The injection being finished, and the subject cold, remove the pipes, and tie up the parts they were in. Whenever a vessel is open by accident or otherwise, be sure to secure it by ligature, or cover it with a piece of thin and moist bladder, or the injection will always be oozing out. The parts dissected and dried are to be varnished twice or thrice with copal or hard varnish, first washing them free from grease with some soap-lees, and well drying them again.

When it is required to demonstrate the vascularity of a part where there is no opportunity of injecting it; if membranous, the blood may be detained in the vessels by quickly drying and varnishing it. The blood when extravasated, or when (as in piles) preternaturally collected in vessels, may be coagulated by a solution of alum; or blood, in inflamed parts, may be coagulated by distilled vinegar. In other instances, or in preparations of the lacteals, their natural fluids may be coagulated and preserved by plunging them suddenly into strong spirits. There are many parts of the body which it is impossible to keep for any time in their original beauty, and these are the most delicate and interesting, as the organs of the senses and all minute nervous parts, the villi of the intestines,

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